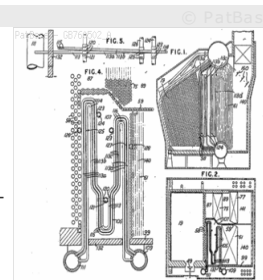


1) Family number: 19506394 (GB760502A)**IMPROVEMENTS IN OR RELATING TO VAPOUR GENERATING AND SUPERHEATING UNITS**

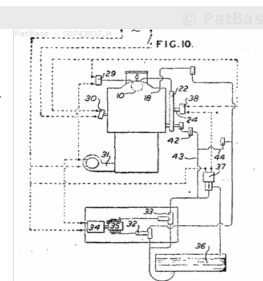
Abstract: Source: GB760502A 760,502. Water-tube steam boilers; superheaters. BABCOCK and WILCOX, Ltd. Feb. 17, 1955 [Feb. 17, 1954], No. 4653/54. Addition to 714,050. Classes 123(2) and 123(3) The water-tube steam boiler described in the parent Specification is modified in that the superheater headers are disposed externally of the superheater pass and are spaced apart sufficiently for the superheater tubes to be removed or inserted between them and in that the tubes of the superheater bank are so disposed as to provide an access space either beside or within the bank from which the tubes may be cleaned and the-baffle separating the two passes repaired. The boiler includes a tube-lined combustion chamber 19 fired by oil burners 49, the combustion gases passing laterally through a screen 58 of steam generating tubes into parallel passes 140, 141, separated by a tubulous baffle 59, the gas flow through each pass being controlled by dampers such as 160 at the respective outlets therefrom to regulate the superheat temperature. The passes locate vertical banks 61, 75, 77 of steam generating tubes arranged in staggered relation so that the baffle wall 59 is accessible for repair from one side or the other from spaces 87, 89, or 107. The superheater 105 is disposed in space 107 between screen 58 and tube bank 61. It comprises vertical headers 109, 111 disposed outwardly of the side wall 99 of the unit and a large number of horizontal sinuous tubes 113 joining the two headers, each tube consisting of four limbs 113a... 113d joined by return bends 114...116, the tubes being arranged in nested groups of three. Each tube group is supported by fingers 120, 123, 125, 127 projecting from large diameter water tubes 121, 124, 126, 128 respectively, the fingers being placed, see Fig. 5, so that each tube has a continuous downward inclination from one header to the other to allow it to be drained. The end portions of tubes 113 are bent outwardly to connect the headers 111, 109, a removable panel 132 closing the space between the headers, so that any tube group can be renewed by first cutting the tube ends and pulling the individual tubes out through the space and inserting the new tubes in the same manner. Access to the cleaning and maintenance space 107 between the limbs 113b, 113c of the superheater tubes is provided by a passage disposed underneath the superheater. In modifications, an equivalent space is arranged beside the superheater bank or between tube limbs corresponding to limbs 113b, 113c, which in that case are connected to an intermediate header disposed in the same plane as headers 109, 111.

Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19561031

**2) Family number: 20140815** (GB743937A)**IMPROVEMENTS RELATING TO STEAM GENERATORS**

Abstract: Source: GB743937A 743,937. Automatic control systems for boilers. RODGERS and GEARY, Ltd. May 14, 1954 [July 2, 1953], No. 18349/53. Class 38 (4). [Also in Group XIII] In a steam generator comprising two tubulous sections, viz. a water-tube section and a separate forced flow, monotube section from which superheated steam is injected underwater into the water-tube section to evaporate water therein (see Group XIII), the steam pressure is controlled by a device 29 which is responsive to pressure variations in the steam drum 10 and is operable to maintain the pressure at a pre-set value by making or breaking the supply circuit of a motor 31 which feeds oil to the generator furnace burners and of a motor 34 supplying water to the monotube and water-tube sections of the boiler. The water level in the water-tube section is regulated by apparatus comprising an upright standpipe 22 disposed adjacent the boiler and connected at the top and bottom respectively to the drum 10 and to the lower part of the water-tube section so that it contains water to a level corresponding with that in the section. At the water level the standpipe has a branch pipe 24 carrying a level control mechanism 38 having electrical contacts which close when steam reaches a thermally-responsive element in the mechanism and open when the water, which is at a lower temperature, takes the place of the steam, the closing and opening of the contacts controlling the operation of a solenoid valve 37 regulating the flow of water from an auxiliary feed pump 33 which, together with the main pump 32 is driven through a gear-box 35 by motor 34. By means of the gear-box the main and auxiliary pump outputs are adjusted so that together they exceed the evaporative capacity of the burner whereas the main pump alone has an output which is less than this capacity. The main pump delivers water directly to the inlet end 18 of the monotube and, through a restrictor 42, to the watertube section. Normally, the water level in the latter is such that the contacts of mechanism 38 are open so that valve 37 remains open and pump 33 returns water to tank 36. If the level falls and steam reaches the element actuating the contacts they close to complete the circuit to the solenoid of valve 37 which thereupon closes so that pump 33 delivers water through line 43 to the water tube section and through line 44 to augment the supply of water to the monotube section. When the element is again immersed due to the rising water level valve 37 is opened to restore the previous water feed conditions. The boiler is protected against overheating due, for example, to failure of the water supply, by the provision of a thermally-responsive switch 30 connected to one of the tubes of the water tube section, the switch being operable to break the supply circuit to motors 31, 34 if an excessive temperature occurs in the tube. Specification 559,662, [Group XXIX], is referred to.



Probable Assignee: RODGERS AND GEARY LTD

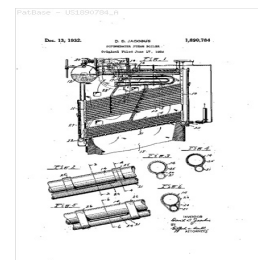
Earliest Publication Date: 19560125

3) Family number: 20951152 (US1890784A)**SUPERHEATER STEAM BOILER**

Abstract: Source: US1890784A 1. In a steam boiler, a bank of superheater tubes with at least a portion of each tube exposed to radiant heat from the furnace, and a row of boiler tubes parallel and adjacent the portions of the superheater tubes exposed to the radiant heat, and means to support each superheater tube from one of said boiler tubes and hold said superheater tube and said boiler tube in close thermal contact.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19301028



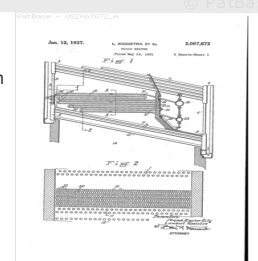
4) Family number: 21391966 (US2067672A)

FLUID HEATER

Abstract: Source: US2067672A 1. In a water tube boiler characterized by a plurality of vertically spaced banks of steam generating tubes connected to uptake and downtake headers, a row of nipples connecting adjacent vertically spaced headers at one end of said banks, a bank of tubes extending across a gas Hue in a plurality of return bends disposed between adjacent banks of steam generating tubes movably engaging a cooperating member secured to said row of nipples.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19370112



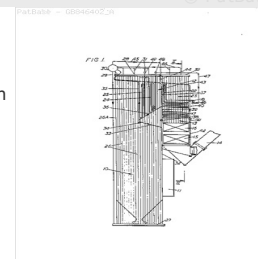
5) Family number: 20395662 (GB846402A)

IMPROVEMENTS IN TUBULOUS VAPOUR GENERATORS

Abstract: Source: GB846402A 846,402. Water-tube steam boilers. BABCOCK and WILCOX Ltd. Nov. 14,1958 [Nov. 8, 1957], No. 34824/57. Class 123(2) A water-tube steam boiler comprises a vertically elongated furnace chamber 10 which is lined with water tubes and has a lateral pass 12 which accommodates secondary superheater banks 24, 25 and leads to a vertical down pass 13 which is divided by a metal plate partition 56 into main pass 9 and a lateral by-pass 19 controllable respectively by dampers 67, 68 Three nested sets 50, 51, 52 of sinuous tubes, extending upwardly from a feed header 53 across the whole of the down pass 13 between side wall portions 54, 55 of refractory material, form superposed economizer tube banks 15, 16. The tube set 50, extending upwardly from the bank 16 as side wall tubes 58 to a header 59, support the inner end of the bank 16, the lower bank 15 being supported by cross-beams 57. The tube sets 51, 52, extending upwardly from an intermediate location of the bank 16 to form respectively economizer banks 20, 21 in the by-pass 19, form wall tubes 60, 61, 62 which feed into a header 63, the tubes 60, 61 being joined together where they cross. The ends of the banks 20, 21 adjacent the partition 56 are supported by beams 64. 65. The lower portion of the rear wall 42 of the pass 13 is formed of refractory material 42, the upper portion being lined with rows 40 of down flow tubes 40 which supply steam to two seriesconnected primary superheater banks 17, 18 which extend across the main pass 9 and lead to a tube bank 22 suspended from the roof 43 of the pass 13 which is formed by the bent-over tubes 40. Steam from the bank 22 passes successively through the secondary superheater banks 24, 25 to an outlet header 49. A proportion of the rear wall tubes 32 of the furnace chamber 10 extends forwardly to form a lower surface 33 of an inwardly projecting arch 34 and some of the arch tubes extend upwardly as a screen 35 across the inlet to the lateral pass 12. The remainder of the tubes, defining the upper surface 36 of the arch 34, extend upwardly as part of a screen 37 across the outlet from the lateral pass 12. The tubes of the rear wall 32, which extend upwardly past the lower part of the arch 34, enter a horizontal header 38 from which a row of smaller tubes 39 extends upwardly to complete the screen 37. In a modification, Fig. 3 (not shown), the pass 13 is divided by two spaced partitions into a central main pass and twolateral bypasses, the economizer banks 15, 16 being formed by four nested tube sets to provide in each by-pass an arrangement of economizer tube banks similar to the banks 20, 21 in Fig. 2.

Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19600831

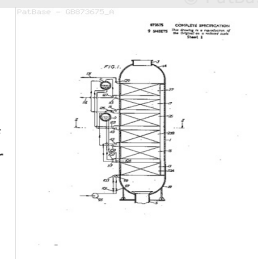


6) Family number: 20774848 (GB873675A)

IMPROVEMENTS IN HEAT EXCHANGERS

Abstract: Source: GB873675A 873,675. Water-tube steam boilers; superheaters. BABCOCK and WILCOX Ltd. June 25, 1959 [July 26, 1958], No. 20518/58. Classes 123(2) and 123(3) A boiler generating steam at a high and a low pressure comprises an upright cylindrical pressure vessel 1 having a top inlet 3 and a lower outlet 5 for a heating fluid, for example the carbon dioxide coolant from a graphite-moderated nuclear reactor. The vessel contains a series of banks of tubes forming the heating surfaces of the high and low pressure boiler sections. The L.P. boiler consists of an economizer 13, a steam generating section 15 delivering steam into a drum 9 and a superheater 17. The H.P. boiler consists of economizers 23A, 23B, a steam generating section 25 delivering steam into a drum 11 and a superheater 27. The tube banks constituting the economizers and superheaters consist of a large number of vertical platens of parallel-connected, multiple-bend, horizontal tubes of the form and of the arrangement within the vessel described with reference to Figs. 2 and 3 of Specification 865,427. The heating gases flow transversely across these tubes through which water or steam pass at a high velocity. The steam generating banks 15, 25 consist of panels of vertical tubes extending between horizontal headers, the heating gases passing longitudinally over the tubes in which the working medium flows at a comparatively low velocity in natural circulation paths including the drums 9 and 11 respectively. As shown in Figs 4 and 5 the generating sections 15, 25 comprise upper and lower headers 73, 77 between which extend a row of tubes 75 each having longitudinal ribs 75A. The headers are connected by tubes 79 passing through thermal sleeves 81 mounted in the vessel wall to tubes 83 which are connected to external inlet and outlet headers. The tubes 79 and associated thermal sleeves of the flanking portions of each bank are set at an angle to enable the outermost tube panels to be placed near the vessel wall and so utilize fully the space within the vessel. In modifications each pair of headers 73, 77 serves two or four rows of tubes through trifurcating pieces, (Figs. 7 to 13 not shown). In these cases the longitudinal ribs on the tubes are arranged to intermesh.

Probable Assignee: BABCOCK AND WILCOX LTD



BAFFLE FOR PROTECTING SUPERHEATER HEADERS

Abstract: Source: US1910439A I claim:- » ' 1. In a water tube boiler, a bank of inclined' ` tubes, a supcrheater above said bank of tubes having one header above the other, a baffle along the upper side of said supcrhcater extending substantially to the upper header of said superheater, and a battle extending in a downwardly inclined direction from the upper hiaclteg of said superheater with its lower ec ge er ree. 2. In a water tube boiler, a bank of inclined tubes, a bafie extending part way along said bank of tubes, a superheater above said bank of tubes having one header above the other, a baille along the upper side of said superheater extending substantially to the upper header. of said superheater. and a battle extending in a downwardly inclined direction from the upper header of said superheater with its lower edge terminating short of said lirst named bailie. Apparatus of the classdescribed comprising, in combination, a water tube steam boiler having straight tubes, a furnace from which heating gases pass across the straight tubes for their entire length, a superheater above said tubes, a Z-shaped bafie having one end part resting on top of the superheater and its remaining parts embracing the superheater headers, and a canopy baiiie extending between said remaining parts to form a three sided box-like enclosure for the headers. 4. In steam generating equipment, a Water tube steam boiler having straight boiler tubes, a steam 'and Water drum, downcomer nipples extending from the steam and Water drum downwardly toward said tubes, a, furnace underneath the boiler and causing heating gases to contact with said tubes over their entire length, a steam superhcater having tubes above the boiler tubes, inlet and outlet headers for the superheater, a Z-shaped baffle construction interposed between the furnace and the headers, and having a long end part above the superheater and extending along the superheater tubes from said headers, and a roof construction including circulator tubes arranged above the batlie construction so as to compel the gases turning between the long leg of the battle and the roof to pass horizontally of the apparatus and leave between the downcomcr nipples. ' _ 5. In a Water tube steam boiler and its furnace, a bank of inclined tubes extending into the path of the furnace gases, a first baiiile extending part Way along sa-id bank of tubes, upper and lower superheater headers located above said bank of tubes, superheater tubes extending from said headers, a` second baiiie along the superheater tubes and forming sub~ stantially an extension of theiirst baiiie in deining a wall of the first gas pass, and a third baffle extending in a downwardly inclined direction from a position in which it overlaps the upper header to a position wherein it terminates short of the first badie and is spaced suiiciiently from the lower header to afford access to the headers by an attendant. . 6. In combination with a water tube steam boiler, a superheater having tubes exposed to hot gases, inlet and outlet headers connected to the tubes, a first badie directing the gases in a first gas pass over the tubes and past the headers without contacting with them, means for diverting the How of gases leaving the superheater to a second gas `pass on the side of the headers opposite to t lat occupied by the tubes, and a second baie extending past the headers in the direction of flow in the second gas pass to direct the diverted gases out of contact with the headers While pro~ viding a. chamber open toward the downstream side with reference to gas movement in the last gas pass and permitting access to the headers when the .boiler is shut down. 7. In a Water tube boiler, a bank of inclined tubes, a superheater above said bank of tubes having one header above the other, a iirst bathe preventing impingement of furnace gases from a first gas pass on the headers, and a second baffle located on the opposite side of the headers from the first and extending in a downwardly inclined direction from the upper header of said superheater with its lower edge left free.

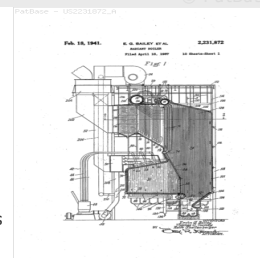
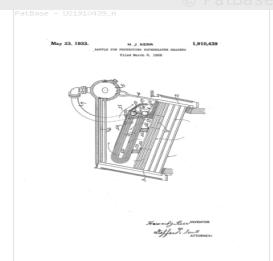
Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19330523

8) Family number: 21456792 (US2231872A)

RADIANT BOILER

Abstract: Source: US2231872A We claim: 1. In s. two stage radiant boiler, a. primary furnace stage including a high temperature combustion chamber having walls defined by fluid cooled tubes covered on their furnace sides With ceramic refractory material, means for burning pulverized fuel in said chamber, a second furnace stage Including a furnace chamber disposed laterally of the primary stage, fluid cooled Wall tubes connected into iuid circulation and having their sides directly exposed to combustion elements in the second stage, means forming an ash hopper beneath the second stage, a. refractory covered nuid cooled furnace iioor for the first stage sloping toward the hopper so as to continuously discharge combustion deposited solids into the hopper and prevent -their accumulation in the first stage, a fluid cooled wall common to both f\,l,l'1'18C€ stages but terminating short of said floor at some positions so as to afford a furnace gas outlet through which combustion elements pass from the lower part of the first stage into the lower part of the second stage and thence upwardly, upright tubes constituting a part of a convection section laterally disposed with reference to the second stage and above the primary stage, and means near the lower ends 'of said upright tubes whereby combustion solids separated from the furnace gas by said tubes will be deflected and discharged into the second stage and thence into the hopper. 2. A two stage radiant boiler comprising, in combination, a. continuous slag tap furnace having a. floor constructed to maintain a/layer of flowing slag thereon, means forming an outlet for furnace gases at the upper part of the furnace. s fuel burner projecting a stream of slag forming fuel through a vertically arranged U-shaped How path of substantial length, said fuel stream and the consequent furnace gas stream changing direction while sweeping across a layer of slag flowing along the furnace floor in the same direction as the furnace gas stream, said action causing suspended slag particles in -said furnace gas stream to separate and adhere to the slag layer and maintaining said layer in flowing condition, and a convection section including a bank of upright furnace wall risers constituting a bank of connection tubes extending across the path of the furnace gases and across said outlet. 3. A two stage radiant boiler associated with a superheater and comprising, in combination, water wall tubes connected into the boiler circulation and defining a primary furnace chamber of small volume lined with ceramic refractory material and associated with burners so as to provide a high temperature ignition and combustion zone in Which intense combustion is promoted by the incandescence of the lining, means for burning a slag'forming fuel in the primary chamber, water being circulated in the Wall tubes so as to generate steam and absorb heat from the lining and thereby maintain the lining, other wall tubes defining abankiess secondary furnace chamber of larger volume than the Primary chamber, said secondary chamber receiving the furnace gases and their suspended solids through a relatively small gas outlet from the primary chamber and presenting metallic heat absorbing wall surfaces acting to cool the gases and their suspended solids to such a temperature value that the solids are chilled and separated from the gases and to such a temperature value that the gases may be safely utilized over the surfaces of the convection section, the convection section including upright furnace wall tube risers presenting a radiant heat screen across a furnace gas outlet for the secondary chamber, tubular superheater elements disposed rearwardly of the screen and across the flow of the furnace gases, the arrangement of the screen and a secondary chamber gas outlet with reference to the gas outlet from the primary chamber being such that the screen and the superheater are disposed at a. position opposite a iuid cooled wall area of much lower temperature than the wall area adjacent the primary chamber outlet, and means Providing a tapered gas pass for the effective absorption of heat by the convection section beyond the screen. 4. A two stage radiant boiler associated with a. high temperature superheater and comprising, in combination, water wall tubes connected into the boiler circulation and defining a primary furnace chamber lined with ceramic refractory material and associated with burners so as to provide a high temperature ignition and combustion zone in which intense combustion is continuously carried on and promoted by the incandescence of the ceramic refractory lining, water being circulated in the wall tubes so as to generate steam and absorb heat from the lining so as to maintain the lining, a lower header from which different rows of wall tubes extend to define opposite sides of the primary chamber, the tubes defining one side also defining the roof of said chamber and being of larger diameter than the tubes of the other row to proportion the flow of fluid in said



rows, other wall tubes defining a secondary furnace chamber of larger volume than the primary chamber, said secondary chamber receiving the furnace gases and their suspended solids through a relatively small gas outlet from the primary chamber and presenting metallic heat absorbing wall surfaces acting to cool the gases to such a temperature value that the gases may be safely utilized over the surfaces of the convection section, the convection section including upright furnace wall tube risers presenting a radiant heat screen across a furnace gas outlet for the secondary chamber, and tubular elements presenting convection surface disposed rearwardly of the screen and across the now of the furnace gases, the arrangement of the screen and a secondary chamber gas outlet with reference to the gas outlet from the primary chamber being such that the screen and the superheater are disposed at a position opposite a fluid cooled wall area of the secondary chamber of much lower temperature than the wall areas adjacent the primary chamber outlet. 5. In a high temperature high capacity radiant boiler, a furnace including a high temperature primary chamber constituting an ignition and combustion section and a large volume secondary furnace chamber into which the furnace gases flow from said section, means for burning fuel in the primary chamber, wall tubes presenting bare metal surfaces as walls of the secondary chamber to reduce the temperature of the furnace gases in that chamber, a convection section including furnace wall tubes arranged vertically across the now of furnace gases from the secondary chamber, a superheater consisting of vertically arranged flat coils of return bend small diameter tubes positioned rearwardly of the furnace wall tubes, means for suspending the superheater coils, and a superheater gas pass wall inclined downwardly toward the secondary chamber, said gas pass wall forming with other walls a tapered gas pass decreasing in cross section away from the secondary chamber. 6. In a fluid heater, a slagging furnace, means for burning a slag forming fuel in the furnace, means forming a furnace gas outlet at the upper portion of the furnace and laterally thereof, vertically arranged steam generating furnace wall riser tubes extending across the furnace gas outlet at one side of the furnace and constituting a part of a convection section, means for minimizing slag deposits on said furnace wall tubes, said means including an arrangement whereby the burners project a stream of slag forming fuel toward the bottom of the furnace, means for causing said slag forming fuel to be burned in suspension at high temperatures while passing through a vertically arranged U-shaped now path, means for causing the fuel stream to change direction upwardly while passing along the furnace floor to cause said slag particles to separate and deposit thereon, and means for causing the deposited slag particles to continuously flow over and from the furnace floor without forming a slag pool thereon, means forming an ash pit below the discharge end of the furnace door, and means near the base of the convection section formed by the steam generating tubes for causing additional solids from the gases to pass through a part of the furnace to the ash pit. 7. In a two stage radiant boiler associated with a superheater and comprising, in combination, water wall tubes connected into the boiler circulation and donning a primary furnace chamber lined with ceramic refractory material and associated with burners so as to provide a high temperature ignition and combustion zone in which intense combustion is continuously carried on and promoted by the incandescence of the ceramic refractory lining, water being circulated in the wall tubes so as to generate steam and absorb heat from the lining so as to maintain the lining, other wall tubes defining a secondary furnace chamber of larger volume than the primary chamber, said secondary chamber receiving the furnace gases and their suspended solids through a relatively small gas outlet from the primary chamber and presenting metallic heat absorbing wall surfaces acting to cool the gases and their suspended solids to such a temperature value that the solids are separated from the gases and the latter may be safely utilized over the surfaces of the convection section, the convection section including upright furnace wall tube risers presenting a radiant heat screen across a furnace gas outlet from the secondary chamber, tubular elements forming the superheater disposed rearwardly of the screen and across the now of the furnace gases, the arrangement of the screen and a secondary chamber gas outlet with reference to the gas outlet from the primary chamber being such that the screen and the superheater are disposed at a position opposite a fluid cooled wall area of much lower temperature than the wall areas adjacent the primary chamber outlet, and means providing a tapered gas pass for the effective absorption of heat by the convection section beyond the screen, said tubular superheater elements formed so as to constitute upright flat tubular coils including roof portions extending along the roof or top wall of the tapered gas pass. 8. In a radiant boiler associated with a multiple stage furnace, means including fluid cooled walls forming a radiant heat absorption chamber in which combustion may be completed, a high temperature ignition and combustion chamber disposed laterally of the absorption chamber at the lower part of the latter, means for burning a slag forming fuel in the high temperature chamber, said high temperature chamber discharging slag laden furnace gases laterally and through openings in an upright screen wall into the absorption chamber, a convection section including upright furnace wall riser tubes disposed above the high temperature chamber and at the same side of the absorption chamber, and a superheater and an economizer positioned above the high temperature chamber and at the same side of the absorption chamber, the superheater including long upright tubes arranged rearwardly of the riser tubes which extend across a furnace gas inlet of such large now area that the impact of partially frozen ash particles on the tubes will not cause those particles to excessively stick to the riser tubes or superheater tubes. 9. In a natural circulation radiant boiler associated with a multiple stage furnace; furnace wall tubes defining a furnace chamber and connected as risers into boiler circulation, a fuel burner, upper drums at least one of which receives the discharge from said wall tubes, an external downcomer of large diameter connected at its lower portion with the furnace wall tubes, said downcomer communicating with the water spaces of both of said drums by external connections, means for confining the furnace gases so that they do not contact with the downcomer or said connections, and an economizer from which feed water passes to the upper portion of the downcomer. 10. In a radiant steam boiler of the type including a primary furnace chamber of small volume and high ignition and combustion temperature, a secondary furnace chamber of large volume receiving furnace gases from the primary chamber, a superheater, upright fluid conducting furnace tubes forming a superheater screen, and an economizer; the combination therewith of a primary furnace chamber lining consisting of ceramic refractory material maintained in a state of incandescence to promote high ignition and combustion temperatures, water tubes denning the walls of the primary chamber and connected into the boiler circulation so as to protect and maintain the ceramic refractory lining, fluid cooled tubes defining the walls of the secondary chamber and presenting wide areas of fluid cooled surfaces absorbing heat from the furnace gases and their suspended solids and also causing separation of the solids and cooling of the furnace gases below ash fusion temperatures and below temperatures at which the superheater tubes will be damaged, the secondary chamber opening out from the primary chamber and allowing the furnace gases a sufficient length of travel and a sufficient time interval in a radiant heat absorption zone to effect, adequate heat absorption therefrom, the superheater consisting of spaced tubes, means for supporting the superheater in such a position that it will not be exposed directly to the intense radiant heat of the primary chamber, means including spaced furnace tubes positioned so as to act as a screen to protect the superheater tubes from the radiant heat of the combustion chamber, and a tapering section forming a gas path for the superheater, said tapering section including a lower wall which is inclined downwardly toward the lower part of the secondary chamber. 11. In a radiant boiler, steel framework constituting the boiler support, a steam and water drum positioned near the top of the framework and suspended therefrom, a small volume high temperature primary combustion chamber having its walls defined by fluid cooled tubes, said chamber being positioned at a substantial distance beneath said drum, a header or drum below the first drum and receiving the discharge from the wall tubes of the primary chamber, a convection section including upright screen tubes directly connecting the first drum with the second drum or header and extending across the path of the furnace gases, fluid cooled wall tubes connected to the first mentioned drum and defining a wall of a large volume low temperature secondary combustion chamber disposed laterally of the convection section and the primary chamber, other fluid cooled wall tubes denning other walls of the combustion chamber, a superheater including return bend coils positioned beyond the screen tubes with reference to gas flow, a counter-flow economizer positioned beyond the superheater, hangers secured at their upper ends to the framework and having their lower ends terminating at positions in or closely adjacent to a common datum plane extending horizontally at a position near the lower end of the means for suspending the drums, water cooled hanger tubes supporting walls of the primary chamber and extending therefrom to certain of said hangers at positions in or near said plane, said water cooled hanger tubes being connected into the boiler circulation and acting as hangers to support walls of the primary chamber beneath the superheater, means forming connections between said hangers and the tubes of the superheater and the combustion chamber wall in or near said datum plane, said drum having its ends projecting beyond the sides of the secondary combustion chamber, large diameter standpipes suspended from the projecting ends of the drum and constituting the downcomers for the system, said downcomers extending below all of the fluid cooled surfaces of the installation and means connecting the lower portions of the downcomers with the wall tubes of the

surfaces of the insulation, and means connecting the lower portions of the downcomers with the wall tubes of the primary chamber and the secondary combustion chamber so that all of said wall tubes and the screen tubes act as risers discharging a mixture of steam and water into the drum. 12. In a radiant boiler of the tube including a small volume high temperature primary furnace chamber in which high ignition and combustion temperatures are maintained, a large volume secondary furnace, chamber for radiant heat absorption receiving furnace gases from the primary chamber, a superheater, upright fluid conducting tubes forming a superheater screen, and an economizer; the combination therewith of a primary chamber lining consisting of ceramic refractory material maintained in a state of incandescence to promote high ignition and combustion temperatures, water tubes defining the walls of the primary chamber and connected into the boiler circulation so as to protect and maintain the ceramic refractory lining, fluid cooled tubes defining the walls of the secondary chamber and presenting wide areas of fluid cooled surfaces absorbing heat from the furnace gases and their suspended solids and also causing separation of the solids and cooling of the furnace gases below temperatures at which the superheater tubes will be damaged, the secondary chamber opening out from the primary chamber and allowing the furnace gases a sufficient length of travel and a sufficient time interval to substantially complete the cooling of the furnace gases, the superheater consisting of spaced tubes, means for supporting the superheater in such a position that it will not be exposed directly to the intense radiant heat of the primary chamber, means including spaced tubes positioned so as to act as a screen to protect the superheater tubes from the radiant heat of the secondary chamber, and a tapering section forming a gas path for the screen tubes and the superheater, said tapering section including a lower wall which is inclined downwardly toward the lower part of the secondary chamber. 13. In a steam generator, a furnace provided with a lateral combustion gas outlet at the upper part thereof, water cooled wall tubes lining the walls of the furnace, upright screen tubes extending across the outlet, means connecting the screen tubes into the fluid system of the generator, the screen tubes acting as risers for subjacent furnace wall tubes, means providing an ash disposal zone at the bottom of the furnace, means forming a gas passage extending laterally from said outlet, said last named means including upper and lower boundary surfaces converging away from said outlet, a superheater including a plurality of transversely adjacent upright tubular elements in said gas passage, said lower boundary surface being inclined downwardly toward the furnace and said zone, and means for burning a slag or ash releasing fuel in the furnace. 14. In a two stage water tube steam boiler attaining such co-ordination of fuel burning and heat exchange that high rates of heat liberation and high rates of radiant heat absorption at large temperature differentials result in the economical production of large quantities of high temperature high pressure steam for power production, means including water wall tubes denning the high temperature combustion chamber of the primary stage of the boiler, means for introducing a mixture of fuel and air into the combustion chamber in a direction to cause slag to be deposited on the door of said chamber and to maintain the surface of the slag in a molten condition, a superheater, means forming a second stage furnace chamber disposed adjacent the primary stage and constituting the radiant heat absorption section in which the furnace gases and their suspended non-gaseous particles from the primary stage have their temperatures decreased so as to permit effective and safe operation of the superheater from the standpoint of metal temperatures as well as that of slag deposits, both of said chambers having water cooled walls with the walls of the second stage chamber presenting metallic furnace faces capable of rates of heat transfer higher than those of the primary stage, a division wall including fluid cooled tubes separating the primary stage from the second stage in such a way that this wall is subjected to high temperature furnace gases on both sides, and a tubular screen extending across the path of the furnace gases forwardly of the superheater with the screen and the superheater being disposed above the primary stage in such position that neither is exposed to radiant heat directly transmitted from the primary stage. 15. In a two stage radiant steam generator involving such co-ordination of fuel burning and fluid heat exchange that high rates of heat liberation and high rates of radiant heat absorption at large temperature differentials result in the economical production of large quantities of high temperature high pressure steam for power production, means forming the high temperature combustion chamber of a primary stage of the generator, means for introducing a mixture of fuel and air into the combustion chamber in a direction to cause slag to be deposited on the floor of said chamber and to maintain the surface of the slag in a molten condition, a superheater, means forming a second stage furnace chamber disposed adjacent the primary stage and constituting the radiant heat absorption section in which the furnace gases and their suspended non-gaseous particles from the primary stage have their temperatures decreased so as to permit effective and safe operation of the superheater from the standpoint of metal temperatures as well as that of slag deposits, both of said chambers having water cooled walls with the walls of the second stage chamber being capable of higher rates of heat transfer, a division wall including fluid cooled tubes separating the primary stage from the second stage in such a way that this wall is subjected to high temperature furnace gases on both sides, and a tubular screen extending across the path of the furnace gases forwardly of the superheater with the screen and the superheater being disposed above the primary stage in such position that neither is exposed to radiant heat directly transmitted from the primary stage. 16. A water tube steam boiler associated with a superheater and an economizer and comprising, in combination, water wall tubes connected into the boiler circulation and denning a primary furnace chamber lined with ceramic refractory material and associated with burners so as to provide a high temperature combustion zone in which combustion is effected at high rates, water being circulated in the wall tubes so as to generate steam and absorb heat from the lining so as to maintain the lining, other wall tubes denning a secondary furnace chamber of larger volume than the primary chamber, a division wall including fluid cooled tubes separating the primary furnace chamber from the secondary furnace chamber in such a way that the wall is subjected to high temperature furnace gases on both sides, said secondary chamber receiving the furnace gases and their suspended solids through a relatively small division wall gas outlet from the primary chamber and presenting metallic heat absorbing wall surfaces acting to cool the gases and their suspended solids to such a temperature value that the solids are separated from the gases and the latter may be safely utilized over the surfaces of the convection section. and a convection section including upright furnace risers presenting a radiant heat screen across a furnace gas outlet for the secondary chamber, a superheater including tubular elements disposed rearwardly of the screen and across the flow of the furnace gases. the arrangement of the screen and the secondary chamber gas outlet with reference to the gas outlet from the primary chamber being such that the screen and the superheater are disposed at such a position that they are not exposed to direct radiant heat of the primary chamber. 17. In a two stage water tube steam boiler, means forming the high temperature combustion chamber of the primary stage, said means including water wall tubes connected into the boiler circulation and covered on their furnace sides with ceramic refractory material held in good thermal relation to the wall tubes, means introducing a mixture of fuel and air into said chamber for effecting high rates of combustion therein, water walls defining a second stage furnace chamber receiving high temperature furnace gases from the primary stage, the latter walls presenting metallic surfaces directly exposed to the furnace gases and being capable of a high degree of heat absorption, a convection superheater having spaced tubular elements exposed to heat from the furnace gases after the latter have been cooled in the second stage, the superheater being disposed laterally of the second stage and above the primary stage in such a manner that it is not subject to radiant heat directly transmitted from the high temperature primary stage, spaced fluid cooled screen tubes disposed across the path of the furnace gases and subject to contact therewith before the gases contact with the superheater elements, and another set of fluid cooled screen tubes extending across the gas outlet through which the gases pass from the primary stage to the second stage, and means for connecting both sets of screen tubes into the boiler circulation.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19410218

9) Family number: 21039097 (US1905292A)

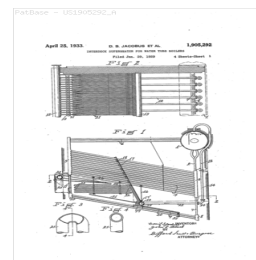
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INTERDECK SUPERHEATER FOR WATER TUBE BOILERS

Abstract: Source: US1905292A 1. In a boiler superheater, tubes and an inlet header, a plurality of connections from the steam space of said boiler to said header, and means in said header to distribute the steam entering it from said connections.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19330425



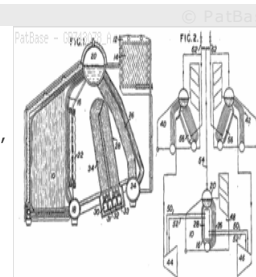
10) Family number: 20111500 (GB743078A)

IMPROVEMENTS IN AND RELATING TO BOILER INSTALLATIONS

Abstract: Source: GB743078A 743,078. Water-tube steam boilers. FOSTER WHEELER, Ltd. March 18, 1954 [March 19, 1953; Aug. 20, 1953], Nos. 7650/53 and 23021/53. Class 123(2). In a water-tube boiler intended primarily for reheating steam in a marine power plant installation which has two water drums 18, 24 connected respectively by spaced banks 16, 26 of steam generating tubes to an upper steam and water drum 20 and a furnace chamber 10 bounded on one side by the bank 16, its other surfaces being lined with further steam generating tubes, two reheaters formed as a single tube bank 28 are disposed in the space between tube banks 16, 26, the bank 16 being of considerable depth so as to screen the reheaters from direct radiation whilst allowing the degree of reheating to be varied by adjusting the furnace firing rate without unduly affecting the rate of steam generation. A superheater 22 may be disposed immediately behind bank 16 and an economizer 14 is located in the gas outlet flue 12. The reheater unit is of the form described in Specification 743,077 having two inlet headers 30, 31 and two outlet headers 32, 33 connected by U-tubes 34 which provide for identical heating paths for the two separate streams of steam. Fig. 3 shows the arrangement of the reheat boiler 48 in a two-boiler installation, the main boilers 40, 42 supplying superheated steam to turbines 44, 46 respectively, the steam to be reheated passing to reheaters 28 through pipes 50 and returning to the turbines through pipes 52. Steam generated in the reheat boiler passes through pipe 54 either to the main boiler superheaters 56 or through pipes 62 to auxiliary plant.

Probable Assignee: FOSTER WHEELER LTD

Earliest Publication Date: 19560111



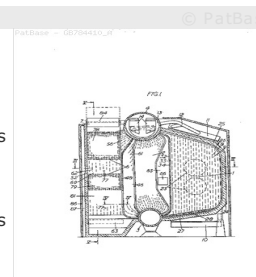
11) Family number: 20511799 (GB784410A)

IMPROVEMENTS IN TUBULOUS VAPOUR GENERATING AND VAPOUR HEATING UNITS

Abstract: Source: GB784410A 784,410. Water-tube steam boilers; regulating superheat. BABCOCK and WILCOX, Ltd. Nov. 3, 1955 [Nov. 4, 1954] No. 31979/54. Classes 123(2) and 123(3) A water-tube boiler especially for marine use comprises an oil-fired furnace 1 lined with water-tubes and disposed to one side of upright tube banks 2, 5 of water-tubes which, with the lining tubes, extend between a lower water drum 3 and an upper steam and water drum 4. Gases leave the furnace through a tube-screen 31 and flow laterally through an open pass 29 between tube walls 42, 43 into a space 46 adjacent a transverse tube wall 48. The tubes in the lower portion of the wall 48 are offset to provide a gas flow passage into a vertical pass 69 disposed behind the wall and containing superheater tube banks 78, 79. At the top of pass 69 are disposed dampers 84 by means of which the gas flow in the pass and hence the steam temperature are controlled. The gases which do not enter the superheater pass flow from the space 46 first towards and then away from the furnace in successive passages containing respectively the tube bank 2 and 5 and enter a space 67, disposed behind the superheater pass and separated therefrom by a tube wall 49, from which they flow to the stack through a damper-controlled outlet 7. The superheater pass 69 is of such large cross-sectional area, extending behind the tube bank 2 at one side and into an outward extension 71 of the front wall 41 of the unit at the opposite side, that it can accommodate a superheater with a large heat-exchange surface whereby high steam temperatures can be attained with small draught loss. In a modification, the gases from the furnace flow directly into two side-by-side passes the first of which locates a steam generating tube bank at a part disposed adjacent an open part of the second pass of relatively smaller cross-sectional area whilst the second pass locates a superheater at a part disposed adjacent an open part of the first pass of relatively smaller cross sectional area which forms a section of the gas outlet flow path from the steam generating bank.

Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19571009



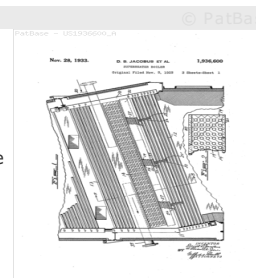
12) Family number: 23112253 (US1936600A)

SUPERHEATER BOILER

Abstract: Source: US1936600A 1, In a water tube boiler having horizontally inclined water tubes and setting therefor, a superheater having a bank of tubes extending across the Water tubes, and headers outside the boiler setting and extending in the same general direction as the water tubes and connected to the ends of the superheater tubes, the bank of superheater tubes being divided into at least three sections, side by side, with a double length header at each side of the setting, each connected to ends of the tubes of two of said sections and with a single length header at each side of the setting, each connected to the ends of the tubes of one of said sections, the headers on the same side of the setting being at different vertical heights and the ends of the tubes of the respective sections being bent to enter the headers to which they are connected.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19331128



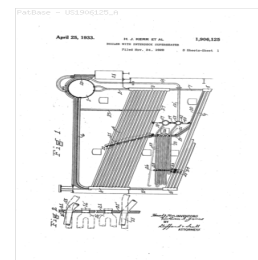
13) Family number: 21042774 (US1906125A)

BOILER WITH INTERDECK SUPERHEATER

Abstract: Source: US1906125A 1. In a Water tube boiler having superposed banks of inclined tubes spaced apart, an interdeck superheater having inlet and outlet headers in the space between said banks, and a plurality of tubes from the steam space of said boiler entering the inlet header from points beyond the ends of said banks, said tubes having removable portions and straight sections lending from the inlet header to the removable portions exteriorly of the tube bank ends so that the tubes can be expanded in the inlet header by passing an expander through the parts of the tubes which enter the header.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19330425



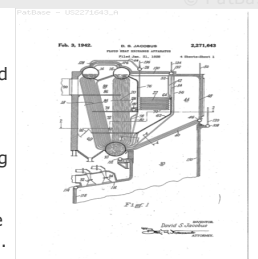
14) Family number: 19654566 (US2271643A)

FLUID HEAT EXCHANGE APPARATUS

Abstract: Source: US2271643A 1. In a water tube steam boiler, a plurality of upper drums, means forming a submerged lower chamber, banks of tubes connecting the drums with said chamber, a furnace, a superheater in front of the bank of tubes connecting the forward upper drum with said chamber and positioned at a level intermediate the levels of the chamber and said forward drum, the furnace delivering hot gases to the space beneath the superheater, screen tubes extending across the path of furnace gases at a position between the furnace and the superheater, means for connecting the screen tubes into boiler circulation, baffles forming two separate gas paths for the travel of the gases in parallel from a position forwardly of the superheater to a position beyond the first bank of tubes, one of said gas paths constituting a superheater by-pass and leading from the gas space beneath the superheater over some of the water tube surface provided by said tubes, and a regulator located rearwardly of said tube surface and at the outlet of said by-pass.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19391114



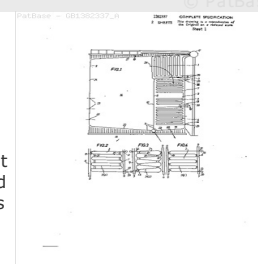
15) Family number: 566392 (GB1382337A)

STEAM BOILER

Abstract: Source: GB1382337A 1382337 Water-tube steam boiler WAAGNER-BIRO AG 12 April 1972 [26 April 1971] 16976/72 Heading F4A A water tube steam boiler comprises a furnace chamber 15 and a flue 2, there being a radiant superheater 1 at the upstream end of the flue, and further heat exchange surfaces, such as a convection superheater 3 and a coiled tube economizer 4, located in the flue vertically below the superheater 1. The walls of the chamber 15 are provided by or lined with vertical finned evaporator tubes 9, those forming rear wall 16 of the chamber also forming front wall 6 of the flue, some of the tubes of this wall passing in front of the superheater 1 and others being bent to form a grid 5 between it and the superheater 3. The tubes 9 are connected by fins (10), Figs. 6, 7 (not shown), there being wider fins (11) on the tubes forming rear wall 7 of the flue, through which pass feed pipes 12, 13, 14 of the heaters 3, 4. The heaters 3, 4 are supported by brackets (8), Figs. 2-4 (not shown), either directly or by tie rods (21).

Probable Assignee: WAAGNER BIRO AG

Earliest Publication Date: 19721116



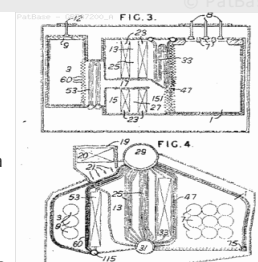
16) Family number: 20135171 (GB737200A)

IMPROVEMENTS IN TUBULOUS VAPOUR GENERATING AND VAPOUR HEATING UNITS

Abstract: Source: GB737200A 737,200. Water-tube steam boilers; steam superheaters. BABCOCK and WILCOX, Ltd. Dec. 18, 1953 [Dec. 23, 1952], No. 32676/52. Classes 123 (2) and 123 (3). A water-tube steam boiler especially for marine use has two furnace chambers 1, 3 lined with refractory covered steam generating tubes and fired respectively by burner groups 8, 12 through ports 7, 9 in the front wall of the unit, the gases from furnace 1 discharging laterally through a screen 47 of generating tubes into parallel gas passes 13, 15 separated by a passage way 17 and leading to a common uptake 19 in which is disposed an economizer 20. The gas flow through each pass 13, 15 is controlled by dampers 21 at their respective outlets into uptake 19. The passes 13, 15 locate respectively the sections 25 and 27 of a convection steam generating tube bank 23, the tubes of which extend between a water drum 31 and a steam and water drum 29, the latter also receiving the output from the furnace lining tubes which extend from lower headers 75 and 115. Between the screen 47 and the tube bank 25, pass 13 locates a superheater 33. The gases from furnace 3 also discharge laterally through a screen 60 behind which is disposed a reheater 53, the gases, after traversing the reheater, flowing through passageway 17 into a turning space 151 which serves to direct them into pass 15 and thence to uptake 19. During normal operation, both furnaces are fired, the steam output and reheat temperature being respectively regulated by adjustment of the firing rate of burners 8, 12 whilst the superheat temperature is regulated by control of dampers 21. During manoeuvring, furnace 1 is worked to give a substantial output of steam with little or no superheat whilst furnace 3 and reheater 53 are inoperative, the safety of the reheater being ensured since it is screened from furnace 1 and is not subjected to gas flow. During starting, furnace 1 only is fired, dampers 21 of pass 13 being closed to prevent damage to the superheater. In modified forms of the unit (Figs. 5-9, not shown) furnaces 1 and 3 are disposed side by side, the gases from furnace 3 flowing into furnace 1 after passing through a screened reheater.

Probable Assignee: BABCOCK AND WILCOX LTD

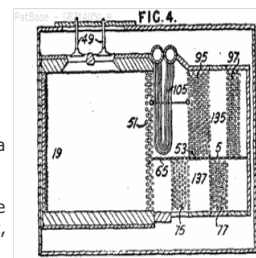
Earliest Publication Date: 19550921



17) Family number: 19462188 (GB714050A)

IMPROVEMENTS IN OR RELATING TO VAPOUR GENERATING AND SUPERHEATING UNITS

Abstract: Source: GB714050A 714,050. Water-tube steam boilers; superheating. BABCOCK and WILCOX, Ltd. Nov. 10, 1950 [Nov. 10, 1949], No. 28866/49. Classes 123(2) and 123(3) In a superheating boiler two parallelconnected gas passes lead laterally from a single combustion chamber to a single uptake; both the passes contain vapour generating tube banks and a super heater is contained in. one of the passes; a damping device is located on the uptake side of the banks. As shown, fuel enters the combustion chamber 19 from burners 49 and the hot gasses flow laterally through the water-tube screen 51 into the two parallel gas passes 135, 137, and upwardly through two main outlets, not shown. The outlets lead to a common uptake and are each controlled by a separate damper. The passes 135, 137 are separated by a baffle wall 53 comprising tubes 65, the spaces between which are filled with refractory material. Pass 135 contains the superheater 105 and the vapour generating tube banks 95, 97. Pass 137 contains the vapour generating tube banks 75, 77. Cooling air enters the casing at the rear and passes round the boiler to the front where it is fed to the burners. In one modification (not shown) the baffle is formed of a double wall enclosing an inspection space and in a second embodiment, not shown, the superheater element extends from 135 into 137.



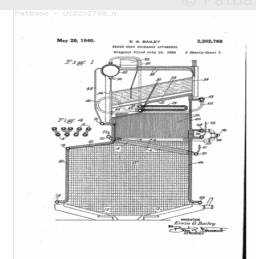
Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19540818

18) Family number: 21241368 (US2202768A)

FLUID HEAT EXCHANGE APPARATUS

Abstract: Source: US2202768A 1. In a sun visor for vehicles wherein the visor is disposed for extension across the windshield area of the vehicle and is pivotal about a horizontal axis to shield occupants of the vehicle from the glare of the sun, the improvement comprising: a sun visor extension unit including a support frame of generally rectangular configuration having opposed surfaces and means for attaching one of said surfaces to a surface of said sun Visor; a lateral visor extension panel of flat generally rectangular configuration disposed between said opposed surfaces of said unit, said unit including a horizontal guide passage between said opposed surfaces for lateral advancement of said extension panel away from said unit through one of said opposite ends of said unit, said extension panel having grasping means at opposite ends of said extension panel whereby to require positive manual engagement and movement in a horizontal direction of said extension panel through said guide passage; and a light-diminishing glare shield normally disposed in superimposed relation to said extension panel, said glare shield being of flat, generally rectangular configuration, said unit having guide means frictionally engaging said glare shield to normally retain it in the superimposed position with respect to said extension panel, said guide means including a downwardly opening guide slot for downward vertical extension of said shield beyond the lower edge of said sun visor, grasping means on said shield engageable by an occupant of the vehicle to adjustably position said shield different extended distances downwardly and away from said unit and beyond the lower edge of said sun visor, and limit stop means interposed between said glare shield and guide means to limit the movement of said glare shield a maximum extended distance away from said unit in a downward direction.

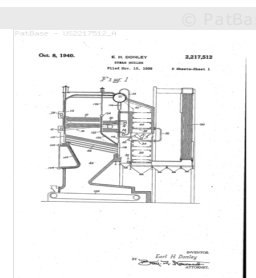


Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19400528

19) Family number: 21331907 (US2217512A)

STEAM BOILER



Abstract: Source: US2217512A I claim: 1. In a steam boiler, a furnace, a steam generating section including a bank of tubes exposed to the heat of the furnace, a primary superheater in a position which is remote from the steam generating section, a primary economizer section, means providing a plurality of gas passes arranged in parallel between said superheater and said economizer section, a secondary economizer section in one of said parallel gas passes, a secondary superheater in another of said parallel gas passes, and means for proportioning the total gas flow between said parallel gas passes for maintaining a predetermined superheat over a wide range of boiler loads. 2. In a steam boiler, a furnace, a steam generating section including tubes extending across a primary gas pass leading from the furnace, a primary superheater section including tubes also extending across the primary gas pass, a primary economizer section, means providing a plurality of secondary gas passes arranged in parallel between said superheater and said economizer section, a secondary economizer section in one of said parallel gas passes, a secondary superheater in another of said parallel gas passes, means for proportioning the total gas flow between said parallel gas passes, and means for connecting the superheaters so that steam flows from the primary superheater to the secondary superheater. 3. In a steam boiler, a steam generating section including a bank of tubes extending across a gas pass, a primary superheater including tubes beyond the steam generating section, a primary economizer section, means providing a plurality of gas passes arranged in parallel between said superheater and said economizer section, a secondary economizer section in one of said parallel gas passes, a secondary superheater in another of said parallel gas passes, means for proportioning the total gas flow between said parallel gas passes, means connecting the superheaters for the series flow of steam therethrough, and means similarly connecting the economizers for the series flow of water therethrough to the steam generating section. 4. In a steam boiler, a steam generating section including tubes extending across a gas pass, a primary superheater including tubes beyond the steam generating section, a primary economizer section, means providing a plurality of gas passes arranged in parallel between said superheater and said economizer section, a secondary economizer section in one of said parallel gas passes, a secondary superheater in another of said parallel gas passes, and regulators at the gas inlets of the primary economizer for proportioning the total gas flow between said parallel gas passes in order that the superheat may be maintained at substantially the same values over a wide range of boiler load variation. 5. In a steam boiler, a steam generating section including tubes extending across a gas pass, a primary superheater including tubes beyond the steam generating section, a primary economizer section, means providing a plurality of gas passes arranged in parallel between said superheater and said economizer section, a secondary economizer section in one of said parallel gas passes, a secondary superheater in another of said parallel gas passes, and regulators at the outlet of each of the parallel gas passes for proportioning the total gas flow between said parallel gas passes to compensate for changes in the boiler load and maintain a desired superheat. 6. A water tube boiler having a primary superheater subjected to the heat of furnace gases in a relatively high temperature zone, a secondary superheater subjected to the heat of furnace gases but located in a zone of relatively low gas temperatures, means for connecting the superheaters in series with reference to steam flow, means to direct all of the furnace gases across the primary superheater, means whereby the furnace gases leaving the primary superheater are divided so as to flow in the same direction through parallel gas passes in one of which the secondary superheater is located, an economizer section in another of said parallel gas passes, means to direct the gases adjacent the ends of the parallel gas passes for proportioning the flow of furnace gases between said parallel gas passes according to the load imposed on the boiler, and another economizer section receiving the flow of all of the furnace gases after they have passed through one or both of said parallel gas passes. 7. A water tube boiler having a primary superheater subjected to the heat of furnace gases in a relatively high temperature zone, a secondary superheater subjected to the heat of furnace gases but located in a zone of relatively low gas temperatures, means for connecting the superheaters in series with reference to steam flow, means to direct all of the furnace gases across the primary superheater, means whereby the furnace gases leaving the primary superheater are divided so as to flow in the same direction through parallel gas passes in one of which the secondary superheater is located, an economizer section in another of said parallel gas passes, means for proportioning the flow of furnace gases between said parallel gas passes, and another economizer section receiving the flow of all of the furnace gases after they have passed through one or both of said parallel gas passes. 8. In a water tube steam boiler, a steam generating section subjected to the heat of furnace gases, means for establishing three separate fluid heating zones arranged serially in the direction of gas flow, the first and last of said zones being undivided while the second zone is divided into a plurality of parallel gas passes, a primary superheater section in the first zone, a primary economizer having tubes arranged in the last zone and across the gas flow from both of said passes, the secondary superheater section arranged in one of the gas passes of the second zone, an economizer arranged in the other gas pass of the second zone, and regulators arranged forwardly of the third zone for controlling the proportioning of the gas flows in the parallel paths of the second zone to control superheater and economizer operation. 9. The method of operating a steam boiler and associated superheater and economizer which comprises effecting heat exchange between high temperature furnace gases and water flowing in restricted and separated paths across the path of said furnace gases, causing said furnace gases to superheat steam flowing in restricted paths across the path of said gases beyond said restricted water flows (with reference to gas flow) and through a superheating zone, utilizing radiant heat of the furnace gases approaching the steam generating zone to further superheat the steam flowing in restricted paths from the first superheating zone, dividing the furnace gases beyond said superheating zone so that they flow in a plurality of paths, effecting further superheating of the steam by the gases flowing in one of said paths, causing absorption of heat by feed water flowing in restricted paths across another of said paths, effecting a further absorption of heat by the feed water after the furnace gases flowing through said paths have been reunited, and counter-acting variations from a desired superheat temperature by apportioning the percentages of the total amount of gases passing through said gas paths in response to said variations and steam flow. 10. In the superheating of steam, causing a first absorption of heat from high temperature furnace gases by steam flowing in restricted paths, subsequently dividing the stream of furnace gases so that it flows in a plurality of parallel gas paths, effecting a further superheating of the superheated steam in one of said parallel gas paths, causing an absorption of heat by feed water flowing in restricted paths across the path of the furnace gases in another of said parallel paths, apportioning the percentages of the total amount of gas flow through said parallel paths in response to variations of superheat from a desired value, and causing all of the gases from said parallel paths to pass over feed water of a lower temperature than that in one of the parallel paths, said lower temperature feedwater flowing through the combined gases and thence to the above mentioned restricted feedwater paths. 11. In a water tube steam boiler, steam generating tubes, a primary superheater section, a secondary superheater section in series with the primary section as to both steam and gas flow, a primary economizer section, a secondary economizer section in parallel with the secondary superheater section as to gas flow and in series with the primary economizer section as to water flow, and means whereby at a given boiler load the gas flow over the secondary superheater section and the secondary economizer section is simultaneously controlled or varied while the gas flow over the primary superheater section and primary economizer section remains constant.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19401008

20) Family number: 21353061 (US2220886A)

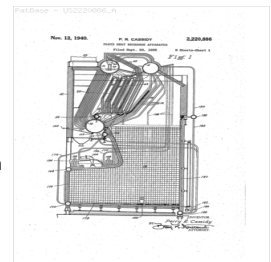
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FLUID HEAT EXCHANGE APPARATUS

Abstract: Source: US2220886A 1, In a water tube steam boiler, an organization including a 'plurality of upper drums connected to a lower drum by front and rear banks of steam generatiigtubes, a furnace, means for directing the furnace gases transversely of the drums and through a nrst gas pass at one side of the boiler, said means including an upright wall ex-tending substantially across one of said banks from front to rear, baffle means including a similar wall and forming a second gas pass in which the gases pass from the outlet of the first pass reversely of their movement in the first pass and forwardly transversely of the tubes of a rear bank, and a superheater positioned in said Brst pass rearwardly of the tubes of the front bank so as to be screened thereby, the front bank being spaced forwardly 'of the superheater throughout its length and forwardly of the foremost Dart of said ba-me means and upright wall so as to form a gas equalization chamber. ,2.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19401112



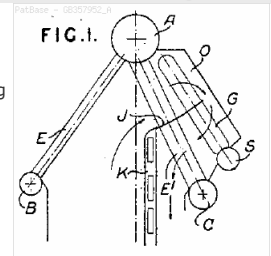
21) Family number: 18961991 (GB357952A)

IMPROVEMENTS IN WATER TUBE BOILERS

Abstract: Source: GB357952A 357,952. Water-tube steam boilers. YARROW, H. E., of Yarrow and Co., Scotstoun, Glasgow. May 22, 1930, No. 15775. [Classes 123 (ii) and 123 (iii).] A superheater comprising rows of U-tubes G springing from a drum S parallel with the boiler steam drum A is accommodated in a chamber O beyond a bank EI of water-tubes, space for this chamber being provided by an asymmetrical arrangement of the water-tubes and mud drums as by the tubes E<1> being pitched more steeply than the tubes E on the other side of the furnace thereby bringing the mud drum C to a lower level than the mud drum B. The tube bank E<1> may be displaced inwardly so as to bring its centre line inwardly of the centre of the steam drum. A baffling system constrains the furnace gases to traverse the bank E<1> in two or more transverse passes and to traverse the superheater between two successive passes. The furnace wall K is extended to an intermediate point of the tube bank EI and a transverse baffle J is provided in continuation of it. In modifications a second baffle in the lower part of the tubes provides an additional pass for the gases and a damper, which in its extreme position forms a continuation of one of the transverse baffles, may be arranged in the superheater chamber to vary the proportion of gases traversing the superheater tubes.

Probable Assignee: HAROLD EDGAR YARROW

Earliest Publication Date: 19310922



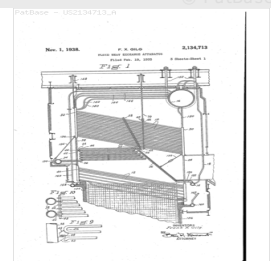
22) Family number: 21625192 (US2134713A)

FLUID HEAT EXCHANGE APPARATUS

Abstract: Source: US2134713A 1. In a water tube steam boiler, a bank of tubes of a superheater having series connected multiple loops, means constituting top supports for the superheater at its ends. metallic intertube connectors rigid with successive tubes of the low temperature section of said bank and forming with said tubes a structure in the nature of a truss, and slip hangers supporting the remaining tubes of said bank from said truss.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19381101



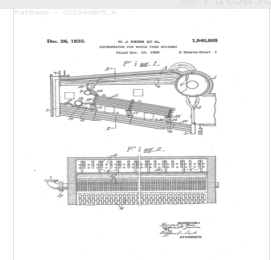
23) Family number: 20190123 (US1940805A)

SUPERHEATER FOR WATER TUBE BOILERS

Abstract: Source: US1940805A 1, In a water tube boiler having a bard; of inclineclitubes, a superheater, supports extending from said bank of tubes to said superheater, said supports being in turn supported by a plurality of rows of tubes of said' bank of tubes through sections spaced apart' anicng said rows of tubes.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19331226

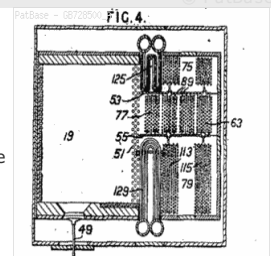


24) Family number: 19686737 (GB728500A)

IMPROVEMENTS IN OR RELATING TO TUBULAR MARINE BOILERS

Abstract: Source: GB728500A 728,500. Water-tube steam boilers; superheating. BABCOCK and WILCOX, Ltd. Jan. 26, 1951 [Jan. 27, 1950], No. 2165/50. Classes 123 (2) and 123 (3). In a superheating boiler three parallelconnected gas passes which lead from a combustion chamber each contain vapour generating tubes, and main and auxiliary superheaters are each confined to a single pass; dampers control the distribution of furnace gases between the passes. As shown, fuel enters the combustion chamber 19 from burners 49 and the hot gases flow laterally through the water tube screen 51 into the three parallel gas passes 75, 77, 79 in each of which a damper controls the gas flow. The passes are separated by baffle walls 53, 55 comprising tubes 89, the spaces between which are filled with refractory material. Pass 75 contains the auxiliary superheater 125 and the vapour generating tube banks 113, 115. Pass 77 contains the tube bank 63. Pass 79 contains the main superheater 129 and the tube banks 113, 115. Cooling air enters the casing at the rear and flows round the boiler to the front where it is fed to the burners. Adjustment of the three dampers together with a fourth associated with an economiser is effected from a single hand wheel, not shown, mechanically connected to the dampers.

Probable Assignee: BABCOCK AND WILCOX LTD



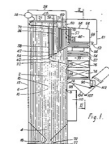
25) Family number: 20801959 (GB881401A)**IMPROVEMENTS IN TUBULOUS BOILERS**

Abstract: Source: GB881401A 881,401. Water-tube steam boilers; superheaters. BABCOCK and WILCOX Ltd. Oct. 31, 1958 [Nov. 1, 1957], No. 34166/57. Classes 123(2) and 123(3) A water-tube boiler has an upright furnace chamber 2 with front and rear tube-lined walls 6, 8 and tube-lined side walls such as 10, the rear wall 8 at an upper portion 28 thereof being common to the furnace chamber and a downflow pass 30. Gases flow from the upper part of the furnace through a lateral pass 36 locating secondary superheaters 70, 72 into a turning space 46 and then downwardly in the pass 30. A vertical baffle 48, Fig. 2, divides the downpass 30 into a main pass 52 and a by-pass 50 the upper parts of which respectively contain primary superheater sections 54, 56 and economizer sections 78, 80 whilst the lower parts contain further economizer sections 74, 76 extending across both passes. Gas flow is proportioned between the main pass and the by-pass for controlling steam temperature by adjusting the outlet dampers 94, 96. The total downward extent of the main pass is reduced by dispensing with the dust hopper usually provided thereunder in order that the furnace burner windbox 110 may be located at the same side of the furnace as and below the bottom 98 of the main pass. The bottom 98 is inclined downwardly from the furnace chamber wall 28 and disposed sufficiently close to the lowermost economizer tube bank 74 to ensure that under all normal operating conditions a gas velocity adequate to sweep dust therefrom exists. A dust hopper 104 provided below the by-pass 50 has front and inner side walls which are inclined to clear the burner wind-box. In a modification a by-pass is provided on each side of the main pass.

Probable Assignee: BABCOCK AND WILCOX LTD**Earliest Publication Date:** 19611101

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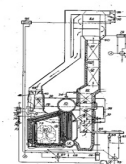
**26) Family number: 20525058** (GB693910A)**IMPROVEMENTS IN AND RELATING TO WATER TUBE BOILERS**

Abstract: Source: GB693910A 693,910. Water-tube steam boilers, superheaters. FOSTER, WHEELER, Ltd. March 28, 1951 [March 28, 1950], No. 7756/50. Class 123 (ii) and 123 (iii) In a steam boiler comprising a furnace 18 from which combustion gases flow through a bank 14 of steam-generating tubes, extending from an upper steam drum 10, to a lower water drum 12, to an exhaust duct 22, the latter locates final and initial steam superheaters 34, 26 respectively followed by an economizer 52 and air preheater 54; a desuperheater 30 is also fitted in the air supply duct 44 between the preheater 54 and the furnace burners 20. The flow of gases through the superheaters is controlled by dampers 40, 42, and the flows of combustion air through the preheater 54 and an associated by-pass by dampers 56, 58 respectively, these dampers being controlled by pistons 64, 65 actuated by a change-over valve 62. With the dampers in the positions shown a high degree of superheat is possible; when low superheat is required the dampers are set in the opposite positions so that the superheater 34 is by-passed by the gases and the preheater 54 by air, relatively cool air thus flowing to the desuperheater 50. Instead of, or in addition to, causing the air to by-pass the preheater, the combustion gases may be caused to by-pass said preheater by operation of a damper 60. The final high or low steam temperature is maintained constant by one of two thermostats 66, 67 which are fitted in the main steam outlet pipe 36 and are brought selectively into action upon operation of a valve 63, said thermostats controlling, through a regulator 69 and piston 73, dampers 46, 48 in the duct 44 associated respectively with the desuperheater 30 and a desuperheater by-pass.

Probable Assignee: FOSTER WHEELER LTD**Earliest Publication Date:** 19530708

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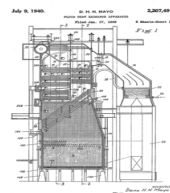
**27) Family number: 21264090** (US2207497A)**FLUID HEAT EXCHANGE APPARATUS**

Abstract: Source: US2207497A 1. A delayed coking unit charge heater for heating a feedstock to delayed coking temperature comprising a heating vessel having upper and lower radiant heating sections, a vertical tube bank between and spaced apart from opposite side walls of said vessel through which said feedstock is transported, said tube bank comprising a back and forth continuous path of horizontal tubing suspended generally in a first vertical plane in said vessel and extending from an inlet in said upper radiant section of said heating vessel downwardly to an outlet located in said lower radiant section of said heating vessel, and a plurality of burners located in the lower radiant section of said vessel on each side of said tube bank so as to be capable of providing and directing sheets of flame upwardly on opposite sides of said tube bank, said sheets of flame each individually lying in a plane generally parallel to the plane in which said tube sheet is suspended. ,

Probable Assignee: BABCOCK AND WILCOX CO**Earliest Publication Date:** 19400709

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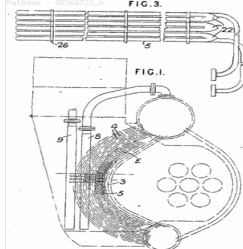
**28) Family number: 19027379** (GB366723A)**IMPROVEMENTS IN AND RELATING TO WATER-TUBE BOILERS AND SUPERHEATERS THEREFOR**

Abstract: Source: GB366723A 366,723. Water-tube steam boilers. JOHNSON, J., Green Shutters, The Highway, Sutton, Surrey. Feb. 6, 1931, No. 3875. Addition to 288,470, [Class 123 (ii), Steam generators]. [Classes 123 (ii) and 123 (iii).] A superheater for accommodation in the crescent-like space E between the outwardly curved tube banks 3, 4 of boilers according to the parent Specification comprises a number of self-contained grids or groups 5 connected to saturated and superheated steam headers 8, 9, and each having a number of U-bends or the like in series and the same number of U-legs running parallel to the drum axis, adjacent grids being so disposed as to follow the form of the space E. In an example a group has twelve legs interconnected in series by solid-forged ends or welded-on caps 22 or by a cast or forged header divided into compartments by transverse partitions. Preferably the centres of the legs are pitched apart at the angles of a system of adjacently disposed equilateral triangles. Transverse spectacle or spreader plates 26 preferably staggered from group to group are provided to maintain the tubes in place. In addition bearers which may be scalloped T-shaped bars resting on the marginal water tubes may support the groups longitudinal steadiers also being provided at points opposite the bearers. In a modification the headers are formed to correspond with the crescent-shaped space and are disposed directly at its end.

Probable Assignee: JOHN JOHNSON**Earliest Publication Date:** 19320211

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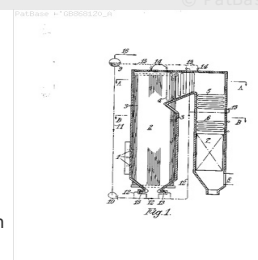


IMPROVEMENTS IN AND RELATING TO STEAM GENERATORS

Abstract: Source: GB868120A 868,120. Water-tube steam boilers; superheaters. MONT INTERNATIONAL ASSOCIATION Ltd. Aug. 30, 1957 [Oct. 3, 1956], No. 30100/56. Classes 123(2) and 123(3) A water tube boiler has an upright furnace divided into two compartments 2, 19 by a vertical tubulous partition 26, each compartment being fired separately by burners 1 and being lined respectively with radiantly heated steam generating tubes 3 and with radiantly heated steam superheating tubes 17. Gases from the upper parts of the evaporating and superheating compartments 2, 19 flow through lateral passes locating respectively an evaporating tube bank 4 and a secondary superheater 29 into down-passes locating respectively another evaporating tube bank 5 and a reheater 31. The lateral passes and the upper parts of the downpasses are divided by a rearward extension 32 of the furnace partition wall, the two gas flows uniting beneath the downpass dividing wall 32 for flow through an economizer 6 and air heater 7. Steam generated in the banks 4, 5 and in the water tubes 3 is separated in a drum 9 and flows in succession through the radiant tubes lining the superheater furnace section 19 and the convection superheater bank 29. During starting- up, only the evaporating section is fired, steam being led to the superheaters when the working pressure has been attained. Firing of the superheater furnace section 19 is commenced when its lining tubes have been warmed up by the steam now and is increased slowly until the desired steam temperature is attained. During normal operation, steam temperature is controlled by adjustment of the firing rate of the superheater section. The invention is of application to forced recirculation boilers as shown in the Figure or to natural circulation boilers.

Probable Assignee: LA MONT INT ASS LTD

Earliest Publication Date: 19610517

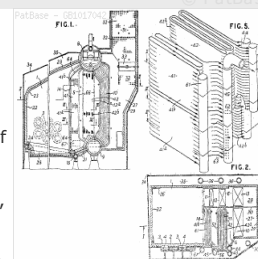


IMPROVEMENTS IN TUBULOUS VAPOUR GENERATING AND SUPERHEATING UNITS

Abstract: Source: GB1017042A 1,017,042. Steam superheaters; water-tube steam boilers. BABCOCK and WILCOX Ltd. March 20, 1962 [March 24, 1961], No. 10879/61. Heading F4A. In a marine boiler having upper and lower drums 8, 9, tubes 23, 26 which connect the upper drum 8 to headers 24, 25 line the side and rear walls of a combustion chamber 1 and a screen of vertical tubes 14 similarly connected to the drum 8 and a lower header 15 is disposed at the other side of the furnace at the entrance to two lateral gas passes 5, 6. In the rear pass 6 are disposed steam generating tube banks 11, 12, 13 and in the front pass 5 are disposed a high temperature superheater 41, a low temperature superheater 42 and a steam generating tube bank 10. Economiser tubes are disposed in the vertical passages leading from the passes 5, 6. The low temperature superheater comprises two sections 42a, 42b, the upper of which has a vertical inlet header 43 extending for approximately two-thirds of the height of the tube bank. The tubes lie horizontally and generally transversely to the flow being of repeated hairpin shape and terminate in a transfer header 44 situated adjacent the inlet header 43. The transfer header extends the full height of the tube bank and provides over the lower third of its height the connection to the tubes of the lower tube bank 42b. The tubes of this section, of which there are twice as many in any one plane as for the section 42a, are of double hairpin shape and are connected into the lower half of an intermediate header 45. A diaphragm 62 divides the lower half of this header from the upper half. The high temperature superheater also consists of two halves 41a and 41b the former being connected between the lower half of intermediate header 45 and the lower half of a further transfer header 61 and the latter being connected for steam flow in the reverse direction between the upper halves of these headers so that finally superheated steam is taken off from the upper half of header 45.

Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19660112

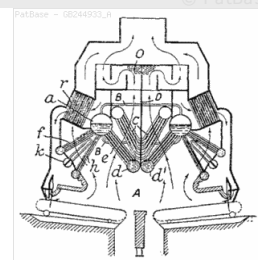


IMPROVEMENTS IN AND RELATING TO WATER-TUBE STEAM GENERATORS

Abstract: Source: GB244933A 244,933. Robson, P. W. Jan. 20, 1925. Water-tube boilers.-A double-ended Yarrow boiler has its drums arranged transversely to the direction of firing. Two boilers are arranged above a combustion chamber A having firing openings at both ends. Each boiler comprises a rear tube bank e and divided front tube banks h, f, between which a superheater k is placed. The steam drums a are connected by balancing pipes B. A single drum may be substituted for the two adjacent water drums d, d<1>, and a wall may be arranged vertically below the single water drum to divide the combustion chamber into two parts. A steam reheater C may be placed between the boilers. The gases are directed by a central baffle D symmetrically through economizers o arranged above the reheater. The gases which have passed the divided tube banks h, f may pass through air heaters r before combining with the gases from the economizers.

Probable Assignee: PHILIP WARWICK ROBSON

Earliest Publication Date: 19251231

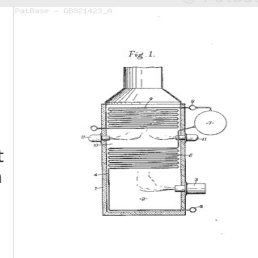


IMPROVEMENTS RELATING TO STEAM GENERATORS

Abstract: Source: GB821423A 821,423. Regulating superheat in watertube steam boilers. THOMPSON WATER TUBE BOILERS Ltd., J. Sept. 7, 1955 [Sept. 9, 1954; March 18, 1955], Nos 26172/54 and 7990/55. Class 123(3) In a water-tube boiler of the forced circulation type having a combustion chamber 2 lined with steam generating tubes and fired by oil burners 3, the combustion gases passing upwardly through a bank 6 of tubes serially connected to tubes 4 and then through a superheater tube bank 9, the size of the chamber 2 and the rate of firing of the burners 3 is such that the heat output is sufficient only to generate steam with a moderate degree of superheat which, when the unit is part of a marine installation, is suitable for manoeuvring or astern operations. During normal operation, when steam with a constant high degree of superheat is required, auxiliary burners 11 fire into a space 10 between the tube bank 6 and the superheater, the firing rate being regulated to maintain the superheat constant irrespective of load variations. The burners 11 are of the type having self-contained combustion chambers which are located outside the boiler casing, each burner injecting a stream of non-luminous, high temperature gases into the space 10. These gases mixed with the tempering gases from chamber 2 pass through the superheater at a temperature high enough to give the required steam temperature but insufficient to cause overheating of the superheater tubes or deposition thereon of slag.

Probable Assignee: THOMPSON JOHN WATER TUBE BOILERS LTD

Earliest Publication Date: 19591007



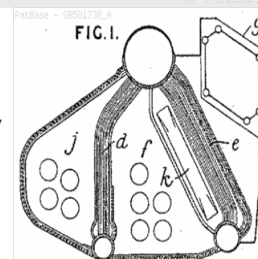
33) Family number: 19464714 (GB581738A)

IMPROVEMENTS IN WATER TUBE STEAM BOILERS

Abstract: Source: GB581738A 581,738. Water-tube boilers. FOSTER WHEELER, Ltd., and SAMPSON, W. Dec. 17, 1942, No. 17943. [Class 123 (ii)] In a boiler having separately fired furnaces j, f and a superheater k in one of the tube banks e, the tubes are so arranged that the gases from one of the furnaces j, before passing over any part of the superheater, pass between boiler tubes d and their path to the common outlet g is not in the path of the gases flowing from the other furnace. The gases may flow from the furnace j to the furnace g through a damper-controlled opening which may be closed to allow the part of the boiler heated by the furnace j to be used as a donkey boiler, the gases from which then pass to the outlet g through a separate dampercontrolled flue. The gases may flow forwards and backwards through banks of tubes instead of vertically. Specifications 484,529 and 528,783 are referred to.

Probable Assignee: WILLIAM SAMPSON

Earliest Publication Date: 19461023



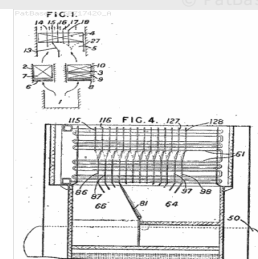
34) Family number: 19555706 (GB717420A)

IMPROVEMENTS IN TUBULOUS VAPOUR GENERATING AND SUPERHEATING UNITS

Abstract: Source: GB717420A 717,420. Water-tube steam boilers; regulating superheat. BABCOCK and WILCOX, Ltd. Sept. 3, 1952 [Sept. 5, 1951], No. 21004/51. Classes 123(2) and 123(3) In a steam boiler comprising parallel gas paths 2, 3, Fig. 1, which lead from a combustion chamber 1 and locate, the pass 2, a bank of steamgenerating tubes 7 screened by a tube bank 6 and, the pass 3, a steam-generating tube bank 10 with a screening bank 8 and intermediate superheater 9, the tubes 6, 7, 8, 10 extending, for example, between an upper steam- and-water drum (not shown) and lower water drums on opposite sides of the chamber 1, the superheat temperature is controlled by a swinging damper 13 which is disposed in a gas pass 5 subsequent to the passes 2, 3 and is adapted differentially to vary the gas flows through the latter passes. The pass 5, which houses an economizer 4, is divided into separate passages by parallel baffles 14-18 with any one of which the damper 13 is adapted to coact. A second or auxiliary damper 27, which normally lies against a wall of the pass 5, may be provided for independently varying relative gas quantities flowing through the passes 2, 3, and, preferably, the two dampers are so arranged that they may be brought into alignment to prevent gas flow through the superheater pass 3 when starting up the boiler. In the practical embodiment of Fig. 4, the parallel gas paths 2, 3 (not shown) lead to spaces 64, 66 above the front and rear parts respectively of the upper steam-and-water drum 50. An economizer 61 extends above the spaces 64, 66, the gas flow through the lower part of the economizer being subdivided into fourteen gas passages by thirteen vertical baffles 86-89 with which co-operates a swinging damper 81. Similarly the flow through the upper part is subdivided by fourteen baffles 115-128 which are staggered with respect to the lower baffles and have associated dampers as shown, said dampers being operated simultaneously so that each coacts with one or the other of the baffles on the two sides of the pivoting axis thereof.

Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19541027



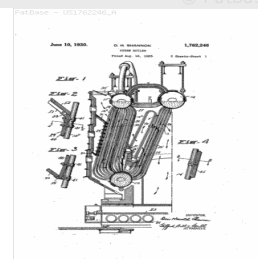
35) Family number: 19791478 (US1762246A)

STEAM BOILER

Abstract: Source: US1762246A 1. A bailic for a Water tube boiler conijrising blocks of refractory material, means or securing said blocks to the boiler tubes comprising strap members each adapted to extend around a boiler tube, means securing said strap members to said blocks, the arrangement of straps and blocks being such that the sides of said blocks are contiguous along the boiler tubes and a strap is secured to contiguous blocks. ~

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19300610

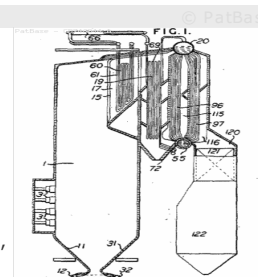


36) Family number: 20157107 (GB746844A)

IMPROVEMENTS RELATING TO TUBULOUS VAPOUR GENERATING AND VAPOUR HEATING UNITS AND TO THE HEATING OF VAPOUR THEREIN

Abstract: Source: GB746844A 746,844. Water-tube steam boilers. BABCOCK and WILCOX, Ltd. May 20, 1954 [May 20, 1953], No. 14160/53. Class 123(2). A water-tube steam boiler has a furnace 1 lined with steam generating tubes such as 11, 31 extending between lower headers 12, 32 and a steam and water drum 20, the furnace being equipped with pulverised fuel burners 3 and having a gas outlet 15 into a lateral pass 17 in which is disposed a secondary superheater 60 consisting of widely spaced tube panels 61. The pass 17 leads into a downpass 19 locating a pendant primary superheater 69 and from the bottom of which the furnace gases flow successively upwardly and downwardly through passes 115, 116 respectively locating the tube banks 96, 97 of the convection section of the boiler, the tubes in banks 96, 97 extending from a water drum 55 to drum 20. The lower end of pass 116 communicates with a downpass 120 containing an economizer 121 and an air heater 122. Saturated steam from drum 20 flows into the primary superheater 69, the partially superheated steam flowing through an attemperator 66, for example of the form described in Specification 559,956, to the secondary superheater 60. The unit generates steam at 1600 lbs. per sq. in. and 1000°F., necessitating a high furnace temperature which, when firing an ashcontaining fuel, results in the furnace gas containing molten fly ash and vapours which condense at temperatures below the range of plastic adhesion temperature of the ash, the condensation range being from 1650°F. to 1200°F. At the rated load of the unit, furnace gas enters pass 17 cooled to a temperature below the fusion temperature of the ash, the wide spacing of panels 61 preventing bridging by the entrained solids, any deposition on the tubes being removed by soot blowers. The gas leaves superheater 60 at a temperature above 1650°F. and passes downwardly over superheater 69, leaving downpass 19 at below 1200°F. Since the gas flow is longitudinally over the tubes of superheater 69, the condensing particles do not impact on and adhere to the tubes but are collected in solid form in a hopper 72 at the bottom of the pass. The superheater surfaces are thus kept effective in spite of the presence of contaminating substances in the furnace gas.

Probable Assignee: BABCOCK AND WILCOX LTD



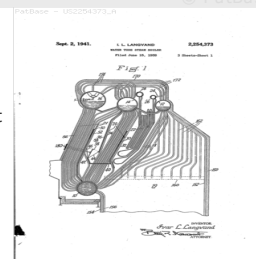
(37) Family number: 21624439 (US2254373A)

WATER TUBE STEAM BOILER

Abstract: Source: US2254373A 1. In a water tube steam boiler, Upper drums, a lower drum, spaced banks of tubes connecting the lower drum to the umler drums, e. furnace, a superheater, bahles forming two separate gas paths for the travel of the furnace gases in parallel from 9. position forwardly of the superheater to a p_it;_gt;smon'beynn_it;1 the irst bank of tubes, one of said gas paths constituting a, superheater bypass leading from the gas space beneath the superheater and across said banks of tubes at a. position adjacent the lower drum, and a gas dow regulator located rearwardly oi' the superheater and selectively movable to a How restricting position for the outlet of said bypass or to a How restricting position for the outlet of the other gas path to control the amount o! bypassing gases. the superheater bypass confining the bypassing gases to contact the lower parts or the tubes of said banks adjacent the lower drum.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19410902



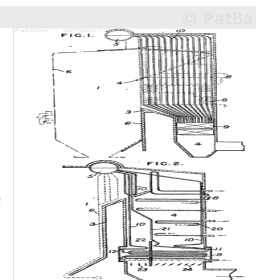
(38) Family number: 19408215 (GB756067A)

IMPROVEMENTS IN AND RELATING TO VAPOUR GENERATORS

Abstract: Source: GB756067A 756,067. Water-tube steam boilers. FOSTER WHEELER, Ltd. Dec. 2, 1954 [Dec. 2, 1953], No. 33532/53. Classes 123(2) and 123(3). In a water-tube boiler having a furnace 1 lined with steam generating tubes 6 extending between lower headers and an upper steam and water drum 5 and in which combustion gases discharge from the furnace through an opening in the upper part of the rear wall 3 thereof to flow downwardly in a vertical pass 4 locating the tube banks of a superheater 8 and an economiser 9, the economiser banks are formed of U-tubes which are each connected to drum 5 by a riser 10, the risers lining the side walls or all of the walls of pass 4. As shown in Fig. 2 the economiser tubes are connected to headers 11, 12, some of the risers from header 11 being used to form a division wall 21 in the downpass 4 to provide a gas by-pass 22 for a reheater 20 disposed below the superheater 8, the gas flows through the by-pass and reheater pass being respectively controlled by dampers 23, 24.

Probable Assignee: FOSTER WHEELER LTD

Earliest Publication Date: 19560829



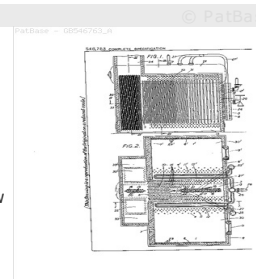
(39) Family number: 20969899 (GB546763A)

IMPROVEMENTS IN TUBULOUS BOILERS

Abstract: Source: GB546763A 546,763. Water-tube steam boilers. BABCOCK and WILCOX, Ltd., and SPARKS, C. H. March 28, 1941, No. 4186. [Class 123 (ii)] The gases from the furnaces 1, 1<1> flow into a longitudinal gas passage 3 between the furnaces across banks of tubes 10 connected to upper and lower drums 14, 13 and arranged in staggered relationship and in longitudinal rows, the pitch of the tubes being increased and the rows shortened towards the front of the boiler to increase the flow of gases across the tubes at the front end of the gas passage. Superheaters 12 are disposed between the tubes. Downcomers 16 are shielded by refractory coverings and by boiler tubes 18. The gases flow from the gas passage 3 into transverse passages 33 containing additional water tube banks 35 connected to the ends of the upper and lower drums extending beyond the furnace chambers.

Probable Assignee: CEDRIC HAROLD SPARKS

Earliest Publication Date: 19420729



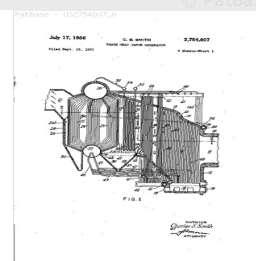
(40) Family number: 19338242 (US2754807A)

WASTE HEAT VAPOR GENERATOR

Abstract: Source: GB709329A 709,329. Waste-heat water-tube steam boilers. BABCOCK and WILCOX, Ltd. Sept. 12, 1952 [Sept. 15, 1951], No. 22983/52. Class 123(2) A steam boiler comprises a setting having tube-lined upright side walls 10, 10 and an inclined roof 13, a bottom with' ash pit 18 and dust hoppers 30, 37, a waste-heat gas inlet 15, and a damper-controlled gas outlet 21, said setting defining a gas-receiving chamber 14 and locating, in succession, a plurality of tube platens 57, 58, a superheater 32 and spaced banks 23, 24, 25 of steam-generating tubes extending between upper and lower drums 26, 27. As shown, the platens 57, 58 are disposed in vertical planes parallel to the side walls 10, the tubes of the platens extending between headers 61, 62, but with some of the tubes of the platens immediately adjacent the walls 10 extending between the headers 41, 42 of the tubes 10a lining said walls. Water is supplied to the lower headers of the setting wall tubes and platens from the lower drum 27 through downcomers such as 46, 47, 48, and to the header 54 of tubes 13a lining the setting roof 13 through downcomers 56. Tube cleaning openings 65, 67, 68, 69 are provided in the setting.

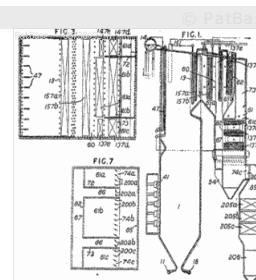
Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19540519



(41) Family number: 20104719 (GB738092A)

IMPROVEMENTS IN TUBULOUS VAPOUR GENERATING AND VAPOUR HEATING UNITS



Abstract: Source: GB738092A 738,092. Water-tube steam boilers; steam superheaters. BABCOCK and WILCOX, Ltd. Dec. 18, 1953 [Dec. 23, 1952], No. 32677/52. Classes 123 (2) and 123 (3). A steam and c. boiler has a furnace chamber 1 fired by burners 41 and lined with closely-spaced steam generating tubes which extend between lower headers 11, 18, and a steam and water drum 14, the upper part of the chamber locating a radiant superheater 47 and having a gas outlet 19 into a lateral pass 60 which leads at its rearward end 62 into a vertical downpass 61, the end 62 projecting over the downpass for about half the depth of the latter. The floor of pass 60 has two inclined parts 65a, 65b which together form a funnel or hopper extending the whole width of the pass and leading into a vertical shoot and gas by-pass 67 disposed at the front side of downpass 61 and separated therefrom by a tube wall 82. The end 62 of pass 60 and the whole of downpass 61 are divided by vertical tube walls 72, 73 into three gas flow paths 61a, 61b, 61c, the lower ends of which have lateral outlets 74a, 74b, 74c respectively controlled by dampers 200a, 200b, 200c and leading into a common downward extension 85 which locates economizer sections 205a, 205b, 205c. The bottom of by-pass 67 is connected by tunnels 86, Fig. 7, having dampers 202a, 202b to the extension 85, a flue 206 connecting the lower part of the extension to the boiler stack. The downpasses 61a, 61b, 61c each locate three superposed banks of horizontal tubes such as 137a, 137b, 137c, Fig. 1, those in the outer passes constituting primary superheater sections and in the middle pass, reheater sections. The sections are connected respectively to banks 137d, 147d and 183b of pendant tubes which are disposed above the floor portion 65b, these banks being connected to further banks 137e, 147e and 183a located above by-pass 67. The secondary superheater consists of banks 157a, 157b of pendant tubes disposed in the forward part of pass 60. Saturated steam from drum 14 passes serially through superheater 47, tubes lining the downpass 61 and forming the dividing walls 72, 73 and 82 and the primary and secondary superheaters, between which an attemperator 151 is disposed. Superheat temperature is controlled by regulation of the attemperator and of the gas flow through by-pass 67 whilst reheat temperature is controlled by regulating the distribution of gas between the outer and middle downpasses. In operation, deposits which build up on the pendant tubes are periodically removed by injection of cleaning fluid, the construction providing, by the location of the inclined floor 65b under tube banks 137d, 147d and 183b, that solid matter dislodged from these banks does not fall into the downpasses to foul the tube banks therein, but is diverted into by-pass 67 wherein it falls into hopper 94 from which it may be periodically removed.

Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19551005

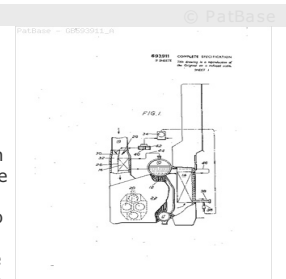
42) Family number: 20525078 (GB693911A)

IMPROVEMENTS IN AND RELATING TO WATER TUBE BOILERS

Abstract: Source: GB693911A 693,911. Water-tube steam boilers, superheating. FOSTER WHEELER, Ltd. May 3, 1951 [March 28, 1950], No. 7757/50. Classes 123 (ii) and 123 (iii) In a water-tube boiler the superheat-temperature is controlled by passing some or all of the saturated steam from the steam-and-water drum 10 through a line 44 to a condenser 16 which is disposed in the combustion air duct 18, the quantities of air flowing through said condenser and an associated by-pass 32 respectively being automatically regulated by means of dampers 28, 30 which are subjected to the control of a regulator 34 under the influence of a thermostat 36 in the steam outlet pipe 38. From the condenser the water-steam mixture flows through a line 46 to the secondary superheater 14b or, alternatively, also through a line 52 to the primary superheater 14a, after mixing with any steam from the drum 10 flowing through a line 50. The relative flow quantities of steam from the drum 10 through the lines 44, 50 respectively may also be controlled in accordance with the steam temperature in the outlet pipe 38. In a modification an indirect contact desuperheater is provided between the two superheater sections 14a, 14b and is supplied with steam and water-steam mixture respectively from the superheater 14a and condenser 16, desuperheated steam and steam generated from the said mixture being led from the desuperheater to the superheater sections 14b, 14a respectively.

Probable Assignee: FOSTER WHEELER LTD

Earliest Publication Date: 19530708



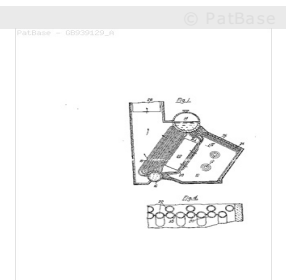
43) Family number: 20850041 (GB939129A)

IMPROVEMENTS IN WATER TUBE BOILERS

Abstract: Source: GB939129A 939,129. Water-tube steam boilers. FOSTER WHEELER Ltd. Sept. 5, 1962 [Sept. 11, 1961], No. 34073/62. Class 123 (2). In a water-tube boiler comprising a combustion chamber 10 lined with steam generating tubes 24 and bounded by a row of screening tubes 20 forming part of one of two banks of steam generating tubes extending between a water drum 16 and a steam and water drum 14 and wherein a superheater 22 is disposed between the two banks, the tubes 20 of the screening row are offset in the region of the superheater to provide the gas flow passage thereto but are provided with ribs 30 bridging the inter-tube spaces or extend in actual contact with one another from the level of the top of the superheater to the roof of the combustion chamber thereby forming a baffle preventing by-passing of the superheater by the gases. The space between the point of contact of the screening tubes with the roof tubes 24 and the drum 14 may be sealed by a cast mass 32 of refractory material.

Probable Assignee: FOSTER WHEELER LTD

Earliest Publication Date: 19631009



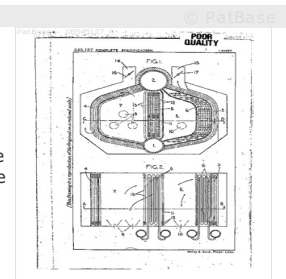
44) Family number: 20928284 (GB545127A)

IMPROVEMENTS IN OR RELATING TO STEAM GENERATING AND SUPERHEATING INSTALLATIONS

Abstract: Source: GB545127A 545,127. Water-tube steam boilers; steam superheaters. SUPERHEATER CO., Ltd., and SOUTHCOTT, L. C. Oct. 8, 1940, No. 15010. [Classes 123 (ii) and 123 (iii)] A boiler has upper and lower drums 2, 1 connected by tube banks 3, 4 enclosing main and auxiliary water-cooled furnaces 7, 8, which are separated by a baffle 11 supported on vertical water tubes 12 and extending partly across the boiler. A superheater 5 on the main furnace side of the baffle is protected by spaced water tubes 13. A superheater or reheater 6 is disposed in the main tube bank 3. The gases from the furnaces 7, 8 may flow directly to their respective uptake 14, 15, but when the boiler is under load, a damper 16 in the uptake 14. is closed to allow the whole or part of the gases from the main furnace to now over the superheater 5 into the auxiliary furnace and thence over the tube bank 3 to the uptake 15. The firing of the auxiliary furnace is regulated to control the temperature of the steam delivered by the heater 6, which may be used as a superheater operating in series or parallel with the superheater 5.

Probable Assignee: SUPERHEATER CO LTD

Earliest Publication Date: 19420512



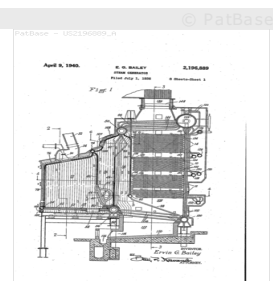
45) Family number: 21217593 (US2196889A)

STEAM GENERATOR

Abstract: Source: US2196889A 1. In a steam boiler having a furnace for the combustion of a slag forming fuel, the combination of wall cooling tubes denning a U-shaped passage for the flow of fuel undergoing combustion; the construction and arrangement of the tubes being such that the legs of the U extend upwardly and the base of the U extends along the bottom of the furnace; means for introducing a slag forming fuel and air at the upper part of one of the legs of the U-shaped passage; an outlet for the furnace gases at the upper end of the other leg of the U-shaped passage, means beneath both of the legs of said passage for collecting slag in a molten condition; means forming a second U-shaped passage the inlet of which communicates with the outlet of the first mentioned U-shaped passage; means for chilling the remaining slag particles as they pass through the second U-shaped passage, means at the base of the second U-shaped passage for separately collecting the chilled slag particles and other ash in a relatively dry form; and a convection heat absorption section consisting of fluid heat exchange tubes extending into the path of the gases as they now upwardly from the base of the second Ushaped passage.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19400409



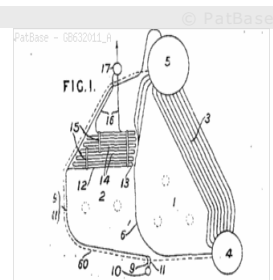
46) Family number: 19377012 (GB632011A)

IMPROVEMENTS IN OR RELATING TO WATER TUBE BOILER AND STEAM SUPERHEATER ARRANGEMENTS

Abstract: Source: GB632011A 632,011. Water-tube steam boilers; superheaters. SUPERHEATER CO., Ltd., and SOUTHCOTT, L. C. Jan. 8, 1948, No. 606. [Classes 123(ii) and 123(iii)] In a steam boiler with separately-fired 'steam-generating and superheating furnaces 1, 2 which are separated by a partition of water tubes 6, combustion gases from the furnace 2 flowing through the spaced upper ends of the tubes 6 to the furnace 1 and thence with the gases from the furnace 1 through the main bank 3 of the steam-generating tubes to a common outlet, the superheater comprises a radiantlyheated section, with the tubes 9, 11 thereof lining the walls of the lower portion of the furnace 2, and an elevated convection section comprising elements 14 each in the form of superposed horizontal tube loops. 'The two sections may be connected in series or in parallel, with the direction of steam flow in the convection section either wholly or partly parallel with, or counter to that of the gas. In the construction shown, saturated steam from the upper boiler drum 5 flows downwardly through radiantly heated tubes 9 to a lower header 10 from which similar tubes 11, interspersed among the downflow tubes 9, lead to the convection section 14, the upper portions 12 of the tubes 11 being bent into a substantial horizontal plane, to extend across the furnace, and connected by return bends 13 to the lowermost tube lengths of said section 14, and the uppermost portions 16 of the elements 14 being upturned to pass through the upper wall of the furnace for connection to a superheated steam header 17. The tubes 11 may line the lower part of the partition 6, and additional cooling of the side wall of the furnace 2 may be effected by water tubes 60 extending between the drum 5 and the lower drum 4. The elements 14 are braced by bands and c. 15 and are suspended from external supports, not shown, above the furnace. Specification 480,536 is referred to.

Probable Assignee: SUPERHEATER CO LTD

Earliest Publication Date: 19491115



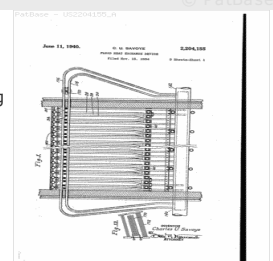
47) Family number: 21248062 (US2204155A)

FLUID HEAT EXCHANGE DEVICE

Abstract: Source: US2204155A 1. In a superheater and boiler organization, fixed superheater tubes, movable superheater tubes maintained in parallelism between the fixed tubes, the tubes being so spaced that a change in spacing varies the heating effectiveness thereof, and a fluid cooled controller connected to the movable tubes and operable to vary the tube spacing and so change the heating effectiveness of all of the tubes that a uniform superheat may be maintained over a wide range of boiler ratings.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19400611



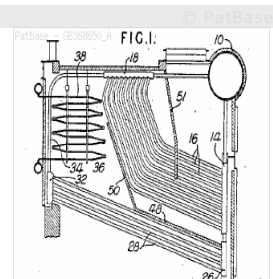
48) Family number: 19042972 (GB368650A)

IMPROVEMENTS IN OR RELATING TO STEAM GENERATORS EQUIPPED WITH SUPERHEATERS

Abstract: Source: GB368650A 368,650. Water-tube steam boilers. SUPERHEATER CO., Ltd., Bush House, Aldwych, London.-(Superheater Co.; 60, East 42nd Street, New York, U.S.A.) Aug. 5, 1931, No. 22223. [Class 123 (ii).] A superheater 38 is located in a space 36 bounded by a bank of bent tubes 16 connecting vertical and horizontal header sets 14, 18, the higher end part of a lower bank of straight tubes 28 connecting headers 26, 32, and the circulators 34 of the straight tube bank leading through the headers 18 to a cross drum 10, baffles 48, 50, 51 directing the gases after traversing the straight tubes first over the superheater and then the bent tubes. The individual superheater elements are arranged to avoid traps for liquid flowing from one header to the other so as to be completely drainable. In a modification alternate vertical rows of tubes connected to the headers 14 consist of straight tubes which extend across the space 36 to vertical headers connected directly to the cross drum. The superheater elements which in this arrangement are vertically arranged are located in the spaces between the straight tubes, their lower ends preferably extending slightly below the water-tubes.

Probable Assignee: SUPERHEATER CO LTD

Earliest Publication Date: 19320310



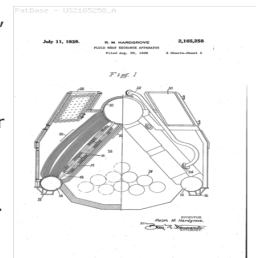
49) Family number: 21360483 (US2165258A)

FLUID HEAT EXCHANGE APPARATUS

Abstract: Source: US2165258A 1. In combination, a. furnace, a steam boiler including upper and lower water chambers, the upper chamber presenting a steam space and a water space, a plurality of steam generating tubes connected to said chambers and disposed across a. gas pass leading from the furnace, some of said water tubes being disposed in spaced banks, a. superheater including tubes extending transversely of the water tubes and positioned in the space between said banks, relatively large diameter water tubes directly connecting said chambers and included in a balanced water cooled support construction between said superheater tubes, metallic plates disposed between said last mentioned water tubes and extending across the superheater tubes at an intersecting plane location with this superheater tubes threaded through openings in the plates, clamping devices including metallic saddle members ~ disposed on opposite sides of the plates and held in good thermal relation with the plates and the large diameter tubes to maintain low metal temperatures in the plates, and means for connecting the superheater tubes with the steam space of said upper chamber.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19390711



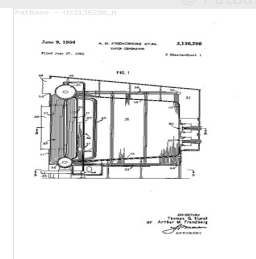
50) Family number: 22652529 (US3136298A)

VAPOR GENERATOR

Abstract: Source: GB1037487A 1,037,487. Water-tube steam boilers. BABCOCK and WILCOX CO. June 25, 1963 [June 27, 1962], No. 25149/63. Heading F4A. In a steam boiler having an upper separator drum and a lower water drum connected by rows of upright tubes and with a furnace chamber disposed at one side of the tube rows, parallel gas passes containing banks of said tubes had gases from the furnace chamber to a common outlet passage also containing a bank of said tubes. In the form shown the boiler has drums 31, 32 connected by vertical tubes 30 and screen tubes 40 which are located to one side of a furnace 16 fired by oil burners 50. The tubes of the middle portion of the outermost tube row 20 of the tubes 30 are sealed together to form a baffle wall which constrains the furnace gases to pass through openings 21A, 22A at the ends of the tube row 20. The thus divided gas flow is conveyed as indicated by the arrows in opposite directions in passes 21, 22 between the tubes 30 therein, the two streams uniting for flow through a common outlet passage 25. The latter contains a bank 37 of vertical downcomer tubes which connect the mid-portions of the drums 31, 32. Steam from the drum 31 flows downwardly in superheater tubes 41 to an outlet main 45.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19630816



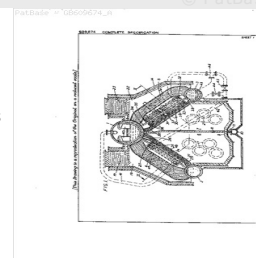
51) Family number: 21073416 (GB609674A)

IMPROVEMENTS IN OR RELATING TO TUBULOUS VAPOUR GENERATING AND HEATING UNITS

Abstract: Source: GB609674A 609,674. Water-tube steam and c. boilers; steam superheaters. BABCOCK and WILCOX, Ltd., and ZOLLER, R. E. March 20, 1946, No. 8632. [Classes 123(ii) and 123(iii)] A marine steam and c. boiler, Fig. 1, comprises a furnace with two separately-fired furnace chambers 6, 7 divided by a wall 8 and provided with individual gas outlet passages 18, 22 between which and the said chambers respectively are located banks of steam-generating tubes 4, 5 extending between an upper steam-and-water drum 1 and lower water drums 2, 3. The tube banks 4, 5 are each constituted by upper and lower sections 4a, 4b and 5a, 5b between which are defined spaces locating, in the bank 4, a first superheater section 24 and, in the bank 5, a second superheater section 30 and a reheater 31. In operation, steam is led from the drum 1 by a pipe 41 to the superheater section 24 and from thence by a pipe 42 to the section 30, some of the steam from the section 24 being, if desired, cooled by passage through desuperheating pipes 43 disposed within the water drum 3; simultaneously, steam from between stages of an associated prime mover is circulated through the reheater 31. The arrangement is such that, during ahead working, both furnaces are fired at an aggregate rate corresponding to the necessary steam output and pressure, the relative rate of firing the furnace 7 being adjusted to the required temperature of reheat and the superheat temperature being regulated by valves 44, 45 which are fitted in the pipe 42 to control the steam flow through the desuperheater 43, but during astern working, when no reheat is required, only the furnace 6 is fired so that the superheater section 30 and reheater 31 becomes ineffective. The wall 8 preferably comprises a row of studded tubes which extend from the drum 1 to a header 10 below the floor of the furnaces and are covered with refractory material applied in plastic condition; such material is also applied to the uppermost row of tubes in the lower sections 4b, 5b of the banks 4, 5 to form baffles 28, 29 and 37, 38, 39 to prevent furnace gases by-passing the superheater sections and reheater. The superheater section 24 preferably comprises two rows of looped tubes extending between headers 25, 26 at the rear of the boiler, the section 30 five rows of tubes connecting headers 32, 33, and the reheater six rows of tubes connecting headers 35, 36, these three units being secured in place by plates mounted on tube rows 27, 34 extending within the banks 4, 5 between the sections thereof. A two-part economizer 19, 23, as described in Specification 551,700 for example, may be located in the gas uptakes 18, 22. The invention may be applied to a boiler in which each of the tube banks 4, 5 has an associated upper steam- and-water drum instead of a single drum common to both banks. In a modification, the desuperheater 43 is dispensed with and the degree of superheat controlled by adjustment of a damper 53, Fig. 4, in a gas by-pass formed by a wall 50 with a metal extension 51 which divides the tube bank 4 into front and rear portions 4a<1>, 4b<1> and 4a<11> and 4b<11>, the first superheater section 24 being located wholly between said tube bank portions 4a<11>, 4b<11>.

Probable Assignee: RONALD ERNEST ZOLLER

Earliest Publication Date: 19481005

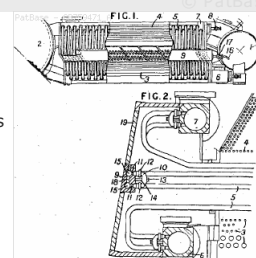


52) Family number: 19692304 (GB759471A)

IMPROVEMENTS IN OR RELATING TO STEAM SUPERHEATERS FOR MARINE AND LIKE WATER TUBE BOILERS

Abstract: Source: GB759471A 759,471. Steam superheaters. SUPERHEATER CO., Ltd., and MELHUISH, H. May 3, 1951 [May 3, 1950], No. 10906/50. Class 123(3). In a superheater, for a water-tube steam boiler, comprising tubular elements 5 extending between steam inlet and outlet headers 6, 7 and wherein each element is formed of at least two U-shaped loops coupled by an inclined connecting bar 9 which is common to all the elements and has passages 11, 11 for effecting communication between the appropriate ends of the loops of said element, the bar 9 is provided with one or more longitudinal drainage ducts 15 which communicate with the passages 11 and also with one another through ducts 18 and is fitted at its lower end with a drain valve 17. The bar 9 may be disposed within the boiler casing 19 or between the plates of the latter, and the tube loops are secured to it by clamps 10, each clamp engaging collars 12 on the two loops and being tightened by a nut 13 on a stud 14 screwed thereinto, or by welding them to stub tubes which are themselves welded to the bar 9. All the loops of an element may be made of mild steel, but preferably the outlet loops is of heat-resisting alloy steel.

Probable Assignee: SUPERHEATER CO LTD



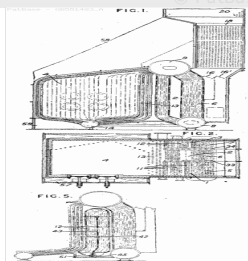
Earliest Publication Date: 19561017
53) Family number: 19049684 (GB551483A)

IMPROVEMENTS IN OR RELATING TO BOILERS

Abstract: Source: GB551483A 551,483. Water-tube steam boilers. BABCOCK and WILCOX, Ltd., and ZOLLER, R. E. Aug. 22, 1941, No. 10709. [Classes 123 (ii) and 123 (iii)] Furnace gases flow from a water-tube lined combustion chamber 4 through parallel passes 1, 2, 3 containing vertical water tubes 5, 6, 7 connected to upper and lower drums 9, 8, and, in the end passes, a superheater 11 and a reheater 12. The gas flow in each pass is controlled by separately operated dampers 16, 16<1> at the top of a partition separating the flow through the lower part of the tubes from the flow through the upper part. The combined gas streams escapes through a feedheater 18 and an air heater 20. The gas passes 1, 2, 3 are separated by walls 33, 34 containing downcomers. The economizer may be divided by plates forming extensions of the walls 33, 34, the flow of gases through the passes being controlled by dampers beyond the economizer. Water tubes 11, 12, 13 in front of the gas passes, and the furnace wall tubes are connected to a water drum 14 at the bottom of the combustion chamber. Air is conducted from the air heater through a duct 58 passing down the back of the combustion chamber into a space 59 below chamber floor and opening into a wind box 57. The U-shaped superheating or reheating tubes 12, Fig. 5, pass through holes in spacer plates 42 positioned by rods 43 secured to lugs 45 on the header 51.

Probable Assignee: RONALD ERNEST ZOLLER

Earliest Publication Date: 19430224



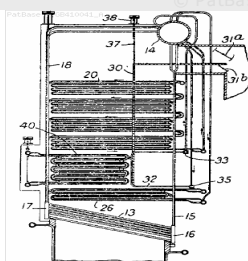
54) Family number: 19860374 (GB410041A)

IMPROVEMENTS IN WATER TUBE STEAM BOILERS

Abstract: Source: GB410041A 410,041. Water - tube steam boilers. BABCOCK and WILCOX, Ltd., Babcock House, Farringdon Street, London.-(Babcock and Wilcox, Co.; 85, Liberty Street, New York, U.S.A.) Dec. 8, 1933, No. 34662. [Classes 123 (ii) and 123 (iii).] In a boiler having an upper flue space bounded at the base by boiler tubes 13 and at the sides and top by circulator tubes 15, 18 connecting a raised steam and water drum 14 with the boiler headers 16, 17, the space is divided by a vertical partition 30 to form separate gas passes, and a steam reheater 40 is arranged in one of the passes and a feedheater 20 is arranged above the reheater and across both passes, the flow of the gases through the passes being regulated by dampers 31, 31 to maintain a constant steam reheat temperature with varying boiler loads. A steam superheater 26 extends across the bottom of the flue space. The partition 30 is supported by auxiliary U-shaped boiler tubes 32 connected to headers 33, 35. The weight on the tubes is carried by rods 37 embedded in the partition and secured to a top support 38.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19340510



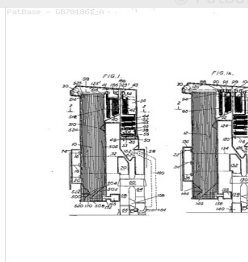
55) Family number: 20446051 (GB781861A)

IMPROVEMENTS IN TUBULOUS VAPOUR GENERATING UNITS

Abstract: Source: GB781861A 781,861. Water-tube steam boilers; regulating steam temperature. BABCOCK and WILCOX, Ltd. Feb. 9, 1955 [Feb. 9, 1954], No. 3821/55. Classes 123(2) and 123(3) A water-tube boiler has a steam generating tube lined furnace of rectangular crosssection divided into two furnace chambers 10, 12 by a tubular partition 14, the chambers 10, 12 each being fired by a set of burners such as 16, 18, 20. Furnace gases leave the upper regions of chambers 10, 12 through respective lateral passes 34, 84, which are spaced sufficiently far apart to provide an access and maintenance space 82 therebetween so that lance soot blowers can be used from both sides of each pass. The pass 34 locates a pendent superheater 40 constituting stage two of the secondary superheater of the boiler and leads to a gas turning space 36 whence gases flow through a downpass 38 in which are disposed tube banks 42, 44, 45, 46 constituting stage one of the primary superheater. From the said tube banks the gases flow downwardly through an economizer bank 56, an outlet controlled by dampers 62 and an air heater 60 to the boiler stack. The pass 84 from the furnace chamber 12 locates banks of tubes 86, 92 constituting respectively stage one of the secondary superheater and stage two of the boiler reheater and leads to a gas turning space 106 and downpass 80 wherein are disposed tube banks 100 contube banks 108, 109, 110 forming stage two of the primary superheater, the gases flowing from the latter downwardly through an economizer bank, a dampercontrolled outlet and air heater as for the other downpass. From each downpass outlet a duct such as duct 160, Fig. 1, conveys cooled flue gas to fans 152, 164, Fig. 2, the outlets of which are connected to respective manifolds such as 166 from which a number of outlet ducts 172 carry the gas into inclined outlet throats 170 extending from the hopper bottoms of the respective chambers 10, 12, the inclination of the throats directing the gases towards the rear wall of the chambers whereon they form a moving screen or blanket of gas which serves to reduce the amount of heat radiated to the wall tubes and correspondingly to increase the heat content of the gases flowing from the furnaces. The generating tubes of the furnace chamber deliver into a steam and water drum 30 whence steam flows through tubes lining both downpasses into a header 50, Fig. 3 at the bottom of pass 38. From the header 50 the steam passes successively through stages one and two of the primary superheater, interstage attemperators (not shown) inserted in lines 178, 180 and stages one and two of the secondary superheater to a final outlet header 186, 188. Control of reheat and superheat temperatures is effected by regulating the amount of flue gas recycled to each furnace chamber and by proportioning gas flows through the two parallel gas passages by means of the outlet dampers, the dampers preferably being used to maintain a predetermined reheat temperature, control of recirculated gas flow being effected to maintain the desired superheat temperature. Attenuation is utilized when necessary, e.g. at high loads, to limit the temperature of superheat. The control of superheat and reheat is further augmented by differential firing of the furnace chambers and by varying the distance from the gas outlets of the operative burners, e.g. at low loads, burners 16 rather than burners 20 are used. Specifications 781,862 and 781,863 are referred to.

Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19570828



56) Family number: 607937 (US3435805A)

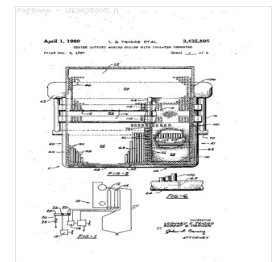
CENTER SUPPORT MARINE BOILER WITH ISOLATED REHEATER

Abstract: Source: US3435805A ABSTRACT OF THE DISCLOSURE

A large capacity boiler is adapted for operation in a marine power plant operating on a vapor reheat cycle. The unit is vertically supported at a level intermediate to its upper and lower ends to accommodate vertical expansion in both directions and the arrangement of tubes is such as to provide an integral reheater compartment having independently operated burners and being isolated from the gas flow through the remainder of the unit in order to protect the reheater tubes during astern operation of the power plant. B

Probable Assignee: COMBUSTION ENG

Earliest Publication Date: 19690401



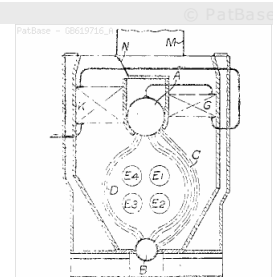
57) Family number: 19818870 (GB619716A)

IMPROVEMENTS RELATING TO WATER-TUBE STEAM BOILERS

Abstract: Source: GB619716A 37473. [Class 123(ii) and 123(iii)] In a steam boiler comprising an upper steam drum A, and a lower water drum B connected by two spaced banks C, D of steam-generating tubes which define a combustion chamber fired by oil burners E1-E4, the combustion gases from the two banks C, D flowing through separate passes to a common uptake M, the said passes respectively locate series-connected primary and secondary super-heaters G, K and that of the secondary super-heater is preferably fitted with an adjustable closing damper N for controlling the degree of superheat. Alternatively the superheaters are nested within their associated tube banks. As shown the secondary superheater has a larger number of tubes than the primary one G and the bank C a correspondingly larger number than the bank D.

Probable Assignee: GEORGE STRACHAN

Earliest Publication Date: 19490314



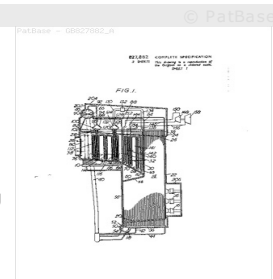
58) Family number: 20740112 (GB827882A)

IMPROVEMENTS RELATING TO TUBULOUS HEAT EXCHANGE APPARATUS

Abstract: Source: GB827882A 827,882. Water-tube steam boilers; superheaters. BABCOCK and WILCOX Ltd. Dec. 20, 1956 [Dec. 21, 1955], No. 38877/56. Classes 123(2) and 123(3) In a boiler comprising a furnace 14 lined with steam generating tubes and fired by burners 16, combustion gases leaving the furnace through a horizontal pass locating a secondary superheater 30, a reheater 32 and a primary superheater 10, the latter is constructed on site from prefabricated tube platens of the form shown in Fig. 2. Each platen consists of eight multiple-bend nested tubes the inlet and outlet portions 102, 120 of which are disposed in a single straight row so that they may pass between tubes 26 lining the roof of the horizontal pass. The portions 102, 120 are welded to junction headers 100, 122 respectively. Below the roof of the pass four of the nested tubes are displaced a short distance from the plane of the portions 102, 120 so that each ulaten consists of two rows of parallel tubes. To complete the superheater, the shop-fabricated platens each comprising the multiple bend tubes and associated junction headers are assembled side-by-side on site. The ends of each of the junction headers 100, 122 are then connected by welded tubes 96, 98 and 124, 126 respectively to main inlet and outlet headers 94, 128 which are disposed transversely above the associated rows of junction headders and the complete unit elevated to its operative position and secured to the appropriate steelwork. The intermediate upper return bends 182, 186 (Fig. 6) of each platen are suspended from the tubes 26 by a bolt 190 connected to welded-on plates 180, 184 by a rod 188 whilst the platen tubes are held at their correct spacing by intertube clevis components 160, 162, 164, 166 shown in Fig. 7. Specification 526,825 is referred to.

Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19600210



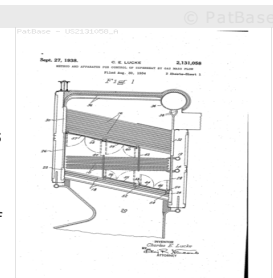
59) Family number: 21564738 (US2131058A)

METHOD AND APPARATUS FOR CONTROL OF SUPERHEAT BY GAS MASS FLOW

Abstract: Source: US2131058A 1. In combination, a steam boiler including 9. bank of steam generating tubes, a furnace from which hot gases pass across the steam generating tubes, a superheater contacted at all times by all of the gases which have passed across the generating tubes, a first set of gas flow regulators contacting with the furnace gases before they reach the superheater, gas baillling means beyond said set of regulators and deilning gas flow passages across said superheater, and another set of gas flow regulators positioned beyond the superheater with reference to gas flow and cooperable with the first set of flow regulators and with said batlling means to cause the gases to pass across the superheater in -a single pass or in a plurality of passes, said sets of regulators cooperating to cause the mass flow of the gases across the superheater to be varied. ,

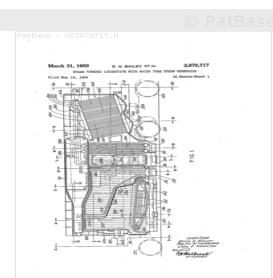
Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19380927



60) Family number: 22851649 (US2879717A)

STEAM POWERED LOCOMOTIVE WITH WATER TUBE STEAM GENERATOR



Abstract: Source: US2879717A (Claim 1) 1. In a vapor generating and superheating unit, an elevated vapor and liquid separating drum; means forming a furnace, an upright tubular furnace screen, a convection superheater, upright tubes forming a convection vapor generating section and a convection air heater arranged in that sequence longitudinally of the drum and at elevations beneath the drum; means including furnace walls and forming a horizontally directed gas pass for said superheater and vapor generating section beneath the drum; said gas pass being formed in part by vapor generating wall tubes; a plurality of lower headers at the sides and ends of the unit rigidly joined to present a rectangular lower header frame with the combined headers connected to the lower ends of wall tubes; the furnace including a chain grate stoker with a refractory covered stoker arch including vapor generating tubes connecting at least one of the headers with the drum; said refractory arch extending at a horizontal inclination over a major part of the stoker to separate a lower primary combustion chamber from an upper secondary combustion chamber for horizontal gas flow to said gas pass; and means for supplying combustion air for the burning of fuel within the furnace; said air supplying means including over-fire air supply devices and under-fire air supply means.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19590331

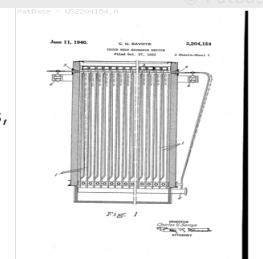
61) Family number: 21248060 (US2204154A)

FLUID HEAT EXCHANGE DEVICE

Abstract: Source: US2204154A 1, In combination, a bank of boiler tubes, a bank of superheater tubes arranged in spaced groups beyond the boiler tubes relative to gas flow, means for movably supporting some of the superheater tubes, tube shields carried by said movable tubes and arranged so as to be positioned in front of some of the fixed tubes, and a fluid cooled superheat control mechanism connected to the movable tubes for causing the shielding of increasing areas of the superheater tubes as the spacing of the superheater tubes is varied.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19400611



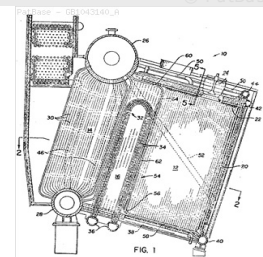
62) Family number: 21359816 (GB1043140A)

A MARINE-TYPE VAPOUR GENERATING AND SUPERHEATING UNIT

Abstract: Source: GB1043140A 1,043,140. Water-tube steam boilers. COMBUSTION ENGINEERING Inc. Nov. 5, 1964 [Nov. 26, 1963], No. 45223/64. Heading F4A. In a marine-type vapour generating and superheating apparatus comprising a furnace section 12, and a boiler bank section 14 with interposed superheating section 16, the front wall 20 of the furnace section 12 is formed by a tube panel extending between headers 44 and 40 and the side walls 18 (Fig. 2, not shown) and the roof 22 of the furnace section 12 are formed by tubes extending from lower headers 38 to upper headers 42 with alternate tubes from each side passing over the top of the furnace section 12 to connect with the upper header 42 of the opposite side. The floor of the furnace section 12, which is made to slope upwards towards its rear, is formed by a fluid circuit of parallelly arranged tubes 58 that extends from the lower header 40. These tubes 58 are bent at right angles adjacent the superheating tubes 34 to traverse the height of the furnace before being bent again at right angles to form a roof 60 over the superheater 32 and to connect with the steam and water drum 26. The tubes 62 adjacent the superheater tubes 34 are spaced so that alternate tubes are displaced and offset into normal alignment with adjacent tubes to form a screen that protects the superheater tubes 34 from radiant heat from the burners 24 whilst allowing the flue gases to pass through to heat the superheater section 16 and boiler bank section 14. The alternate tubes of the screen are returned to closely adjacent relationship level with the top of the superheater to form a gas baffle 64 to prevent gas flow into the void above the top of the superheater. The boiler bank consists of tubes 30 extending between the steam and water drum 26 and a water drum 28, these being also connected by downcomer conduits 46. The superheater 32 is formed of a plurality of inverted U-shaped tubes 34 connected to elongated headers 36. Diagonal external downcomer conduits 52 connect the steam and water drum 26 with the lower front wall header 40 and steam relief conduits 50 connect the said drum with the headers 42 and 44. In a modification the lower front wall header 40 is positioned mid-way along the floor (Fig. 4, not shown) and in a further modification the gas baffle 64 is formed by applying refractory material to the tubes (Fig. 3, not shown).

Probable Assignee: COMBUSTION ENG

Earliest Publication Date: 19650527



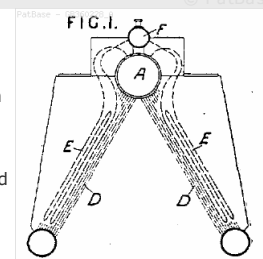
63) Family number: 18979508 (GB360228A)

IMPROVEMENTS IN SUPERHEATERS FOR STEAM GENERATORS

Abstract: Source: GB360228A 360,228. Water-tube steam boilers. YARROW, H. E., of Yarrow and Co., Scotstoun, Glasgow. Dec. 2, 1930, No. 36319. [Class 123 (ii).] The superheater tubes E of a water-tube boiler are accommodated in a space or spaces left by the omission of some of the tubes of a bank of water-tubes D and one end of each element is expanded into the saturated steam drum A while the other is expanded into a superheated steam drum F above and supported by the drum A. The connections of the elements are such that the hottest steam is traversed by the hottest furnace gases and the coldest steam by the comparatively cold furnace gases. The drum F may extend for, e.g. one-third of the width of the bank D, a block of water-tubes being omitted to house the superheater elements; or with a short or a long drum F the elements may be distributed along any part of the full width of the boiler, lanes being left in the bank to take one or more elements.

Probable Assignee: HAROLD EDGAR YARROW

Earliest Publication Date: 19311105



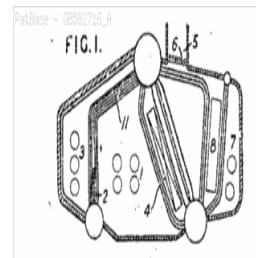
64) Family number: 29653370 (GB582716A)

IMPROVEMENTS IN STEAM BOILERS

Abstract: Source: GB582716A 582,716. Water-tube steam boilers. FOSTER WHEELER, Ltd., and SAMPSON, W. July 7, 1943, No. 11045. [Class 123 (ii)] A steam boiler has three separately fired furnaces 1, 3, 7 the gases from two of which, 1, 3, flow over a superheater 4 to a common outlet 5, the gases from one of the two, 3, being cooled by passage over boiler tubes 11 before reaching the superheater, and the gases from the third furnace 7 flowing over a reheater 8 on their way to the common outlet 5. There may be an economiser 6 in the uptake 5. The gases from the furnace 3 flow over a baffle 2 or, in another form, around the back of a partition which separates the furnaces 1, 3. In a third form, the furnace 7 is on the outside of the furnace 3, and the reheater is placed either in the bank of tubes separating these two furnaces, or above or behind a partition which separates them.

Probable Assignee: WILLIAM SAMPSON

Earliest Publication Date: 19461126



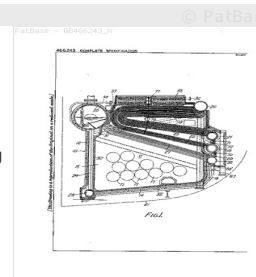
65) Family number: 20978293 (GB466243A)

IMPROVEMENTS IN AND CONNECTED WITH STEAM GENERATORS AND SUPERHEATERS

Abstract: Source: GB466243A 466,243. Water - tube steam boilers. BABCOCK and WILCOX, Ltd. (Babcock and Wilcox Co.) Sept. 11, 1936, No. 24842. [Class 123 (ii)] Steam superheater plant applicable for marine installations and used to superheat steam from an independently fired boiler comprises a combustion chamber 11 with high and low side walls 12, 13, and a closed bottom wall 14 upwardly inclined towards the low side wall, a superheater 18, and a boiler for protecting the walls and superheater comprising an inclined water-tube bank 27 between a water drum 26 at the top of wall 13 and a steam-and-water drum 25 at the top of wall 12, and wall-cooling tubes 32 from a mud drum 28 to drum 26 providing the walls 14, 13. A row of downcomer tubes 29 lies within the high side wall which is protected by tubes 30 the downcomers and tubes 32 providing for a unidirectional flow of water through the tube bank 27 back to drum 25. The superheater comprises a group of tubes 22 between an inlet header 29 and an intermediate header 20 and another group 23 between header 20 and air outlet header 21. Steam from the boiler enters the pipe conveying steam from the main source of saturated steam to the superheater, a valved bypass to the delivery pipe enabling the superheater to be cut out. The plant is supported by frames comprising columns at each side connected by struts 63, 64. A modification provides a superheater with three groups of transversely arranged tubes and inlet and outlet headers exposed to the furnace gases. In another burners are arranged in the high side wall and the superheater is divided into two sections, the steam flow in the one which is nearer the furnace being parallel to the gas flow and in the other, which comprise multi-loop tubes, being counter to the direction of gas flow.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19370525



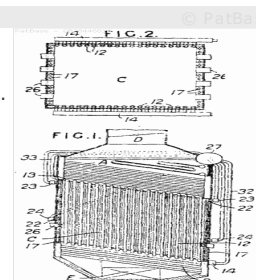
66) Family number: 18409157 (GB284468A)

IMPROVEMENTS IN WATER TUBE STEAM BOILERS

Abstract: Source: GB284468A 284,468. Imray, O. Y., (International Combustion Engineering Corporation). Feb. 2, 1927. Water-tube boilers. -In a boiler having banks of horizontal tubes connected to headers, banks of tubes A, B are spaced apart to form the top and bottom of the combustion chamber C, the side and end walls of which are formed of further water tubes. The side walls consist of finned tubes 12 connected to upper and lower headers 13, 14 placed in communication with the main circulation through the drum 27 by downcomer and upflow tubes 32, 33. The end walls consist of finned tubes 17 connected to the headers of the upper and lower tube banks, and of finned tubes 22 connected to headers 23, 24 placed outside the combustion chamber. The tubes 22 are so arranged as to leave spaces for the insertion of the burners 26 for fuel such as pulverized coal between the lower portions of the tubes 17. The headers 23, 24 of the end walls are connected to the drum 27 by downcomer and upflow tubes. Dampers D, E control the passage of the products through the upper and lower tube banks. A superheater may be placed above the upper bank or below the lower bank of tubes. The walls of the combustion chamber may be formed of tubes without fins placed closely together.

Probable Assignee: INT COMB ENG CORP

Earliest Publication Date: 19280202



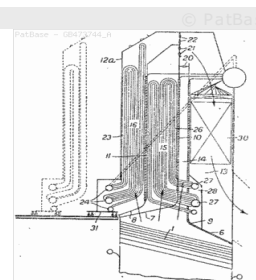
67) Family number: 19052390 (GB473744A)

IMPROVEMENTS CONNECTED WITH WATER TUBE STEAM GENERATORS

Abstract: Source: GB473744A 3285. [Classes 123 (ii) and 123 (iii)] A steam boiler of slightly inclined watertube type has a gas space beyond the main tube bank 1 divided into two or more passes in one 16 of which bounded on one side by part of the boiler casing and unoccupied by generating or circulating tubes a vertical superheater or reheater 23 is disposed with its inlet and outlet headers 24 at the lower end and is withdrawable for repair or its tubes are accessible without disturbance of superheater or boiler tubing in another pass. Tube rows 6, 7, 8, with baffles 9, 10, 11, define four gas passes 13 ... 16 of which the passes 14 ... 16 for the upward flow of gases have dampers 20, 21, 22 controlling their exit to the common serial pass 13 containing a heat absorbing surface such as an economizer 30. A superheater 26 with headers 27 located in a casing 28 is disposed in pass 15 and pass 14 is unoccupied by steam heating tubes. Superheaters 23 and 26 may be suspended from a structure externally of a detachable side portion 12a of a casing which with the superheater headers 24 is mounted on a trolley 31 for withdrawal.

Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19371019



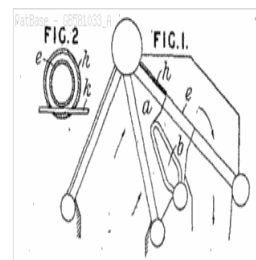
68) Family number: 29651973 (GB581033A)

STEAM TEMPERATURE REGULATOR FOR USE IN CONNECTION WITH WATER TUBE BOILERS

Abstract: Source: GB581033A 12493. Addition to 577,297. [Class 123 (iii)] In the water-tube steam boiler described in the parent Specification, the relative quantities of furnace gases passing through the superheater b and its bye-pass passage a respectively is controlled by an assembly of longitudinally abutting sleeves h, the sleeves being slidably mounted one on each tube of a row in the tube bank e. The sleeves may be actuated by a mechanically-operated carrier bar k which extends therethrough from one side of the boiler to the other.

Probable Assignee: HAROLD EDGAR YARROW

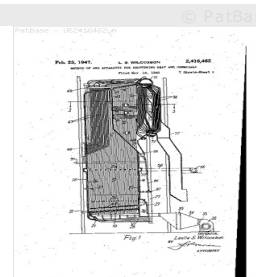
Earliest Publication Date: 19460927



69) Family number: 19153947 (US2416462A)

METHOD OF AND APPARATUS FOR RECOVERING HEAT AND CHEMICALS

Abstract: Source: GB569951A 569,951. Water-tube steam boilers; steam superheaters. BABCOCK and WILCOX, Ltd. Sept. 1, 1943, No. 14259. Convention date, Nov. 12, 1942. [Classes 123 (ii) and 123 (iii)] [Also in Group XII] In the recovery of chemicals and heat from waste liquors, such as the residual liquors in the sulphate and soda processes of manufacturing pulp, by spraying them into a furnace chamber where they are dehydrated and solid combustible material containing chemicals is deposited on the bottom of the furnace, the combustion of the material is effected by supplying primary air below the upper surface thereof. Secondary and tertiary air supplies are delivered to the furnace above the surface of the fuel bed. The liquor is delivered into the furnace chamber 10 by spray nozzles 30, as described in Specification 475,416 [Group XII], and is subjected to the heat of the gases rising from the fuel bed resting in the inclined base 19. A fan 32 delivers air over a steam heated air heater 35 into a conduit 36 and wind boxes adjacent the rear and side walls of the furnace from which it passes through damper controlled ports 44, 50 below and above the surface of the bed of solid combustible material on the base 19. A tapping outlet 31 for the smelted material is arranged in the front wall of the furnace. Above the spray nozzles 30 air supply ports 58 deliver air to the gases from a fan 55. The walls and base of the furnace are lined with water tubes in communication with upper and lower drums 71, 72 of a water tube boiler over which the gases from the furnace finally pass after being directed by baffles 60, 75 over vertical rows of water tubes 67 and steam superheated tubes 80, 81. Any solid matter in the gases passing over the superheater tubes is deposited in a receptacle 95 and returned to the furnace by pipes 96. The baffles 60, 75 are formed by studded water-tubes 22, 173, Figs. 6 and 8, the spaces between which are filled in with refractory material. Brackets 84 welded to the tubes 22 and bars 86 welded to the tubes 173 provide supports for hook shaped lugs 83, 85 on the superheater tubes and permit expansion thereof. Specification 544,587, [Group XII], also is referred to.



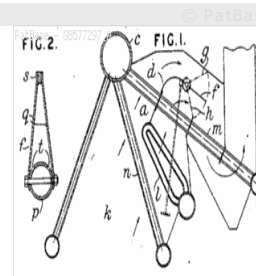
Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19450615

70) Family number: 19287170 (GB577297A)

STEAM TEMPERATURE REGULATOR FOR USE IN CONNECTION WITH WATER TUBE BOILERS

Abstract: Source: GB577297A 10535. [Class 123 (iii)] In a steam boiler in which a superheater I is disposed between two inclined banks n, m of steam-generating tubes through which combustion gases pass in succession from the furnace k to the flue, the degree of superheat is controlled by a damper f which is movable between extreme positions g, h to vary the relative quantities of gases flowing respectively through the superheater and through a by-pass a between the upper end of the superheater and the steam drum c of the boiler. The damper is hingedly mounted on a baffle d defining the by-pass a. and it may be actuated by any suitable mechanism fitted externally of the boiler. As shown, Fig. 2, the damper is constituted by two inclined plates q which are separated at their free edges by distance-pieces s and are secured at their opposite edges to an open-ended air-cooled hollow spindle p having holes t opening into the space between said plates.



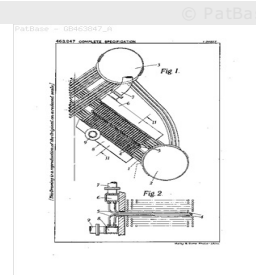
Probable Assignee: HAROLD EDGAR YARROW BART

Earliest Publication Date: 19460513

71) Family number: 20940141 (GB463847A)

IMPROVEMENTS IN OR RELATING TO WATER TUBE BOILERS AND TO SUPERHEATERS FOR USE IN CONNEXION THEREWITH

Abstract: Source: GB463847A 463,847. Water - tube steam boilers. HAWTHORN, LESLIE, and CO., Ltd., R. and W., and JOHNSON, P. B. July 10, 1936, No. 19203. [Classes 123 (ii) and 123 (iii)] In a boiler having crossing banks 1 of upflow tubes as in the Hawthorn-Armstrong boiler, a superheater 4 is inserted between the tubes of one or both of the banks. Horizontal U- tube superheater elements 5 are connected to headers 6, 8 at the sides of a tube bank, the plane of the U- bend of each element being inclined to reduce the space occupied by the superheater.



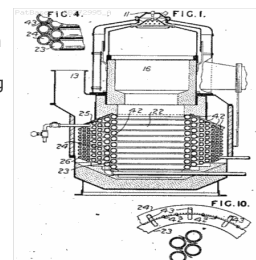
Probable Assignee: R AND W HAWTHORN LESLIE AND COMP

Earliest Publication Date: 19370407

72) Family number: 20086176 (GB772995A)

IMPROVEMENTS IN OR RELATING TO COILED WATER TUBE STEAM GENERATORS

Abstract: Source: GB772995A 772,995. Forced-flow steam boilers. VAPOUR HEATING CORPORATION. Sept. 19, 1955 [Oct. 5, 1954], No. 26761/55. Class 123(2) In a coiled water-tube steam boiler, for example as described in Specification 492,709, comprising a bank of connected coils 23... 26 each consisting of a series of horizontal, circular loops connected by offset portions and positioned one within the other about a common, central, vertical axis, the innermost coil enclosing a central heating space 22 into which flow hot gases from a combustion chamber 16 fired by a burner 11, the gases passing outwardly through the coils to an outlet duct 13; the convolutions of adjacent coils are held at the correct spacing during manufacture by a series of axially-extending, circular section, sinuous wires 42 which, after an inner coil, for example coil 23, has been formed on a mandrel are spot-welded to its outer circumference, the outer coil 24 then being wound on the inner with its turns staggered in relation to those of the inner coil. The number of wires is sufficiently great and their spacing sufficiently small to ensure that the turns of coil 24 are truly circular so that, in operation, a uniform, radially-outward gas flow is obtained at all points on the coil circumference. The cross-section of wires 42 is sufficiently small to ensure that they are readily burned away when the generator is fired, the coils being permanently supported at their correct spacing whilst allowing for expansion movements by diametrically-disposed, rectilinear blocks 43 each of which is welded to either or both of adjacent upper and lower coil turns and has a lateral finger abutting slidably against an adjacent intermediate coil turn. The blocks are each welded to the water-tubes along three sides to secure efficient heat transfer and thus prevent the burning of the block.



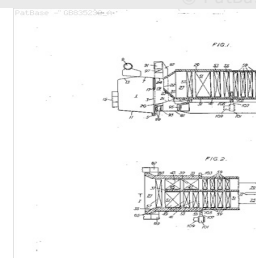
Probable Assignee: VAPOUR HEATING CORP

Earliest Publication Date: 19570417

73) Family number: 20631386 (GB835232A)

IMPROVEMENTS IN TUBULOUS VAPOUR GENERATING AND VAPOUR HEATING UNITS AND A METHOD OF OPERATING SUCH UNITS

Abstract: Source: GB835232A 835,232. Water-tube steam boilers. BABCOCK and WILCOX Ltd., Sept. 4, 1956 [Sept. 7, 1955], No. 25605/55. Classes 123(2) and 123(3) A high-capacity water-tube boiler which may be accommodated in a space affording relatively little headroom for example, a tunnel and which may be brought rapidly from idling to full load without endangering the unit or its associated turbine includes a furnace chamber 1 lined with steam generating tubes extending from lower headers such as 5 to a steam and water drum 9, combustion gases leaving the furnace through an outlet 17 and passing downwardly in an open pass 19 which they leave through an inclined tube screen 25. The gases then enter a horizontally extending gas passage 27 formed by a lining of refractory material within a steel casing and spanned by a secondary superheater 57, the passage thereafter being divided by a wall 37 into parallel passes 39, 41 respectively containing a reheater 43 and a primary superheater 49, economiser sections 59 being disposed downstream in each pass. Gas flow in the passes is controlled by outlet dampers 61 and, beyond the dampers, outlets 63 are provided through which cooled flue gas is withdrawn by fans 67, 69 and supplied through damper-controlled ducts to the bottom of the furnace and to the top and bottom of the open pass 19. For improving the operation of the unit when it is fired to give an output of 5 to 6 percent of its maximum when the turbine is idling, auxiliary gas recirculating means are provided comprising a fan 101 which withdraws gases from the passes 39, 41 downstream of the steam heaters 43, 49 and supplies them to the bottom of the furnace through a damper-controlled duct 109. When operating at full load gases are recirculated to the bottom of the pass 19 to mix with and temper the fresh furnace gas in the zone upstream of the superheater 57. As the load decreases, the recycled gas flow to the bottom of the pass 19 is decreased and that to the top of the pass increased to reduce radiation in the pass and maintain the superheater temperature, the reheat temperature being controlled by adjustment of the dampers 61. In the lower range of loads, gases are recycled to the furnace chamber. At turbine idling load the fan 101 recycles sufficient gas to the furnace to ensure that condensation in the steam heaters does not occur and that the temperatures of the heating surfaces of the unit and the turbine are such that the plant may be rapidly placed under load.



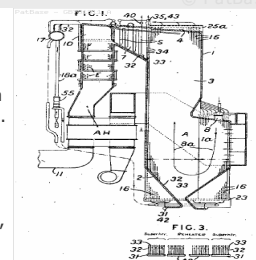
Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19600518

74) Family number: 19784626 (GB731311A)

IMPROVEMENTS IN OR RELATING TO STEAM GENERATORS

Abstract: Source: GB731311A 731,311. Water-tube steam boilers. INTERNATIONAL COMBUSTION (HOLDINGS), Ltd. (Combustion Engineering Superheater, Inc.). Feb. 16, 1953, No. 4322/53. Class 123 (2). A water-tube steam boiler has a furnace A fired by downwardly directed burners 8 mounted in the roof of an offset chamber 1a in the furnace front wall 1. Combustion gases from the burners flow downwardly in chamber 1a and upwardly in the furnace A, discharging through a lateral pass 7 in which is disposed a superheater S and then turning for downward flow through a flue 10 locating an economizer E, the gases passing to an outlet 11 through an air heater AH. The front wall 1, side walls 3 and roof 4 of the furnace are lined with steam generating tubes 16 which extend from a lower header 23 to header 25a which is connected to a steam and water drum 17. The rear wall is lined with superheating and reheating tubes arranged as shown in Fig. 3, two groups of downflow superheater tubes 32 carrying steam from drum 17 being arranged alternately with upflow tubes 33 through which the steam flows to a header 35 and thence through superheater S to the final outlet header 40 whilst the reheater tubes extend from a lower header 42 between the groups of superheater tubes to an outlet header 43. To avoid excessive metal temperature of the steam heating tubes, chamber 1a is divided into separate compartments by vertically disposed banks of steam generating tubes which provide additional heat absorbing surfaces for the furnace A and ensure a safe temperature particularly in the lower portion thereof whilst allowing a high combustion rate to be maintained. The boiler may be operated with natural circulation or with forced circulation in which case a pump 55 delivers water from drum 17 to the lower header 23.



Probable Assignee: INT COMBUSTION HOLDINGS LTD

Earliest Publication Date: 19550608

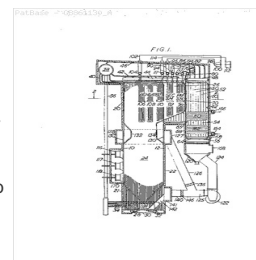
75) Family number: 20595923 (GB861130A)

AN IMPROVED METHOD OF PRODUCING POWER UTILISING HIGH PRESSURE ELASTIC FLUID AND AN IMPROVED TUBULOUS STEAM GENERATING UNIT

Abstract: Source: GB861130A 861,130. Regulating steam temperature in boilers. BABCOCK and WILCOX Ltd. June 11, 1957 [June 13, 1956], No. 18440/57. Class 123(3) A water-tube steam boiler has an upright, hopper-bottom furnace 24 lined with steam generating tubes extending from lower headers 28, 32 to an upper steam and water drum 38 and is fired by burners 116...118, the furnace gases flowing between widely spaced platens 106, 108 of reheater tubes in the upper part of the furnace into a lateral pass 26 in which are disposed more narrowly spaced reheater platens 110 and platens 92, 78 of secondary and primary superheater tubes respectively. The gases leaving the pass 26 flow downwardly in a pass 54 lined with superheater tubes and containing banks 160, 162 of economizer tubes to discharge from the unit through an outlet 168. Cooled flue gases are withdrawn from the bottom of the downpass by a fan 122 which delivers them into the throat 144 of the hopper bottom of the furnace through a duct 140, 142 controlled by dampers 146 and into a furnace region immediately below the reheater platens 106, 108 through a duct 126 controlled by dampers 136. In operation, to maintain the reheat temperature constant over a wide load range, the flow of gases through the duct 126 is increased from a minimum at a partial load corresponding to the lowest load at which the superheat temperature can be maintained to a maximum at full load, the effect of the introduction of cool gas immediately before the reheater being to reduce the radiant heat adsorption of the panels 106, 108. To maintain the superheat temperature constant over a wide load range, an increasing flow of cool flue gas is provided through the duct 140, 142 as the load decreases, the effect of introducing gas into the hopper bottom of the furnace being to decrease the proportion of available heat absorbed by the furnace wall tubes and thus to increase the heat input to the convectively heated superheaters 78, 92. The dampers 136, 146 may be controlled automatically by means primarily responsive to representations of reheat and superheat temperatures respectively. Specifications 526,825 and 656,551 are referred to.

Probable Assignee: BABCOCK AND WILCOX LTD

Earliest Publication Date: 19610215



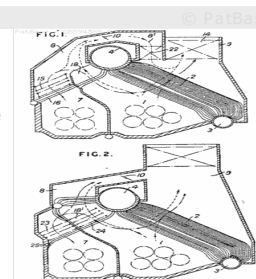
76) Family number: 19662376 (GB594389A)

IMPROVEMENTS IN OR RELATING TO VAPOUR GENERATING AND HEATING UNITS

Abstract: Source: GB594389A 594,389. Water tube steam boilers etc.; steam superheaters. BABCOCK and WILCOX, Ltd., and ZOLLER, R. E. July 6, 1945, No. 17272. [Classes 123 (ii) and 123 (iii)] A steam and c. boiler comprises separate adjustably-fired furnaces 1, 7, Fig. 1, associated respectively with an inclined bank 2 of water tubes, extending between upper and lower drums 3, 4, and a superheater 15, with the outlet from the furnace 7 being in communication with the furnace 1 through a passage 18 and also in direct communication with the boiler flue uptake 9 through a by-pass 8 controlled by a damper 10 which is operated to close the by-pass during ahead operation and open it during manoeuvring. The superheater 15 is screened by a group of water tubes 16, and economizers and/or air heaters 14, 22 are provided in the uptake 9 and in an adjacent part 8<1> of the bypass 8. In a modified construction, Fig. 2, a reheater 23 is disposed across the outlet from the furnace 7 and a superheater 24 in the passage 18<1> between the two furnaces, both 23, 24 being screened by water tubes 25. During ahead operation the steam pressure and degree of reheat are controlled by the rates of firing the furnaces 1, 7 respectively and the degree of superheat by adjustment of the damper 10; during manoeuvring the furnace is shut down.

Probable Assignee: RONALD ERNEST ZOLLER

Earliest Publication Date: 19471110



77) Family number: 21087020 (US2276326A)

FLUID HEAT EXCHANGE APPARATUS

Abstract: Source: US2276326A 1, In a superheater, headers, a bank of spaced U-tubes connected to the headers and arranged in groups transversely of gas flow, the spacing of the tubes within each group being uniform and less than the spacing of the groups transversely of gas flow, means whereby the groups of U-tubes are connected for series flow of steam therethrough from group to group, and by-pass tubes extending across gas flow adjacent the spaces between the groups and arranged so as to cause steam to by-pass some of the U-tubes in order that overheating tendencies adjacent the junctions of the groups may be overcome by increased heat absorption by the by-pass tubes.

Probable Assignee: BABCOCK AND WILCOX CO

Earliest Publication Date: 19420317

