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Armand

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[54] **APPARATUS FOR DRYING AND SUPERHEATING STEAM**

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[73] Assignee: **Babcock-Atlantique,** Paris, France

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[52] **U.S. Cl.** **122/483,** 165/78

[51] **Int. Cl.** **F22g 5/16**

[58] **Field of Search** 122/483; 165/78

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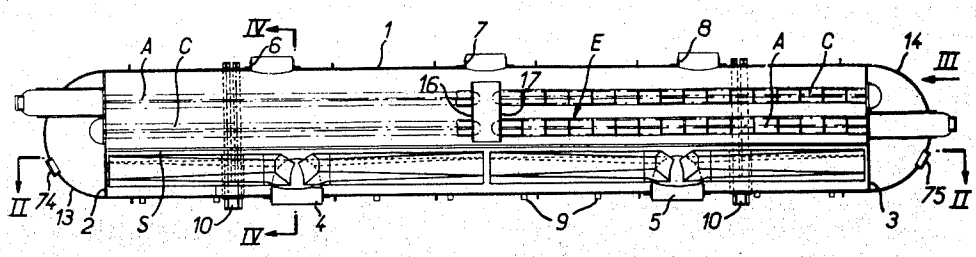
Attorney—Nichol M. Sandoe, Roy C. Hopgood et al.

[57] **ABSTRACT**

An apparatus for drying and heating steam, comprising a horizontally elongated casing, provided with inlet and outlet means for circulating the steam therein from bottom to top along a path successively passing through a moisture extractor, and a surface exchanger forming a superheater, and provided with outlet apertures for these exchanger elements, characterised in that the superheater is composed of a plurality of independent banks of tubes which are elongated in the longitudinal direction of the shell and in cross-section occupy less space in height than in width.

21 Claims, 13 Drawing Figures



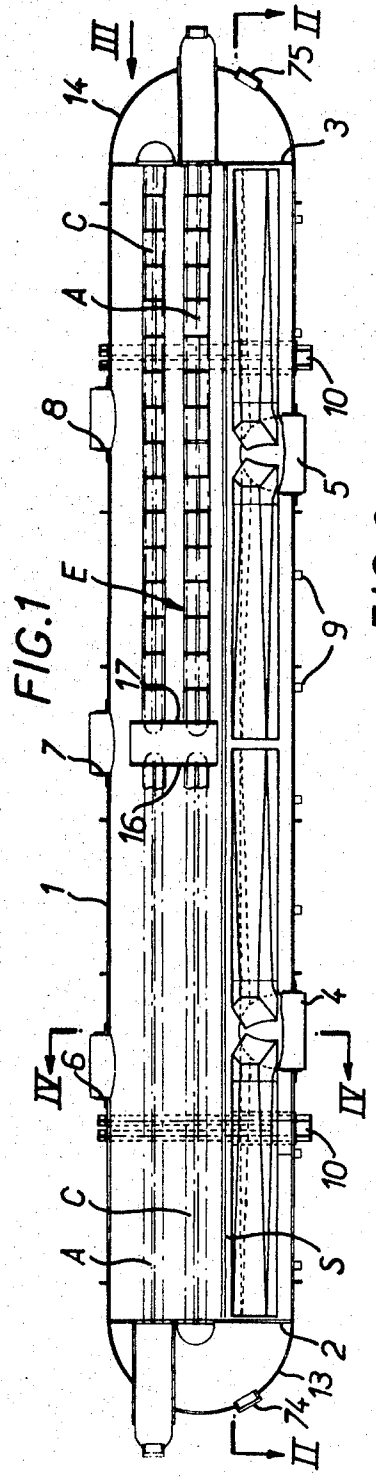


FIG.1

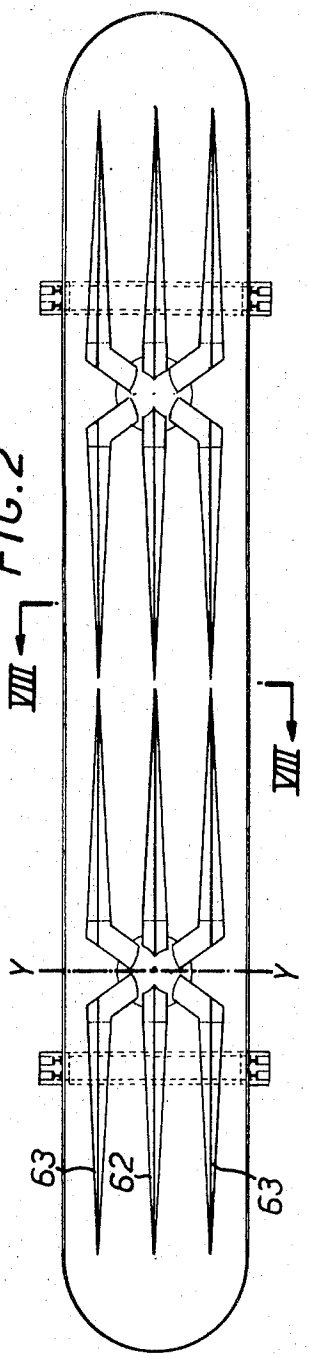


FIG.2

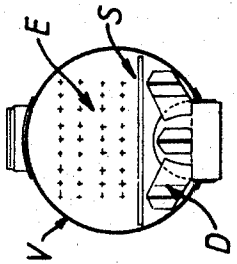


FIG.4

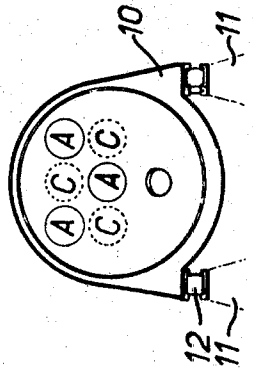


FIG.3

FIG.5

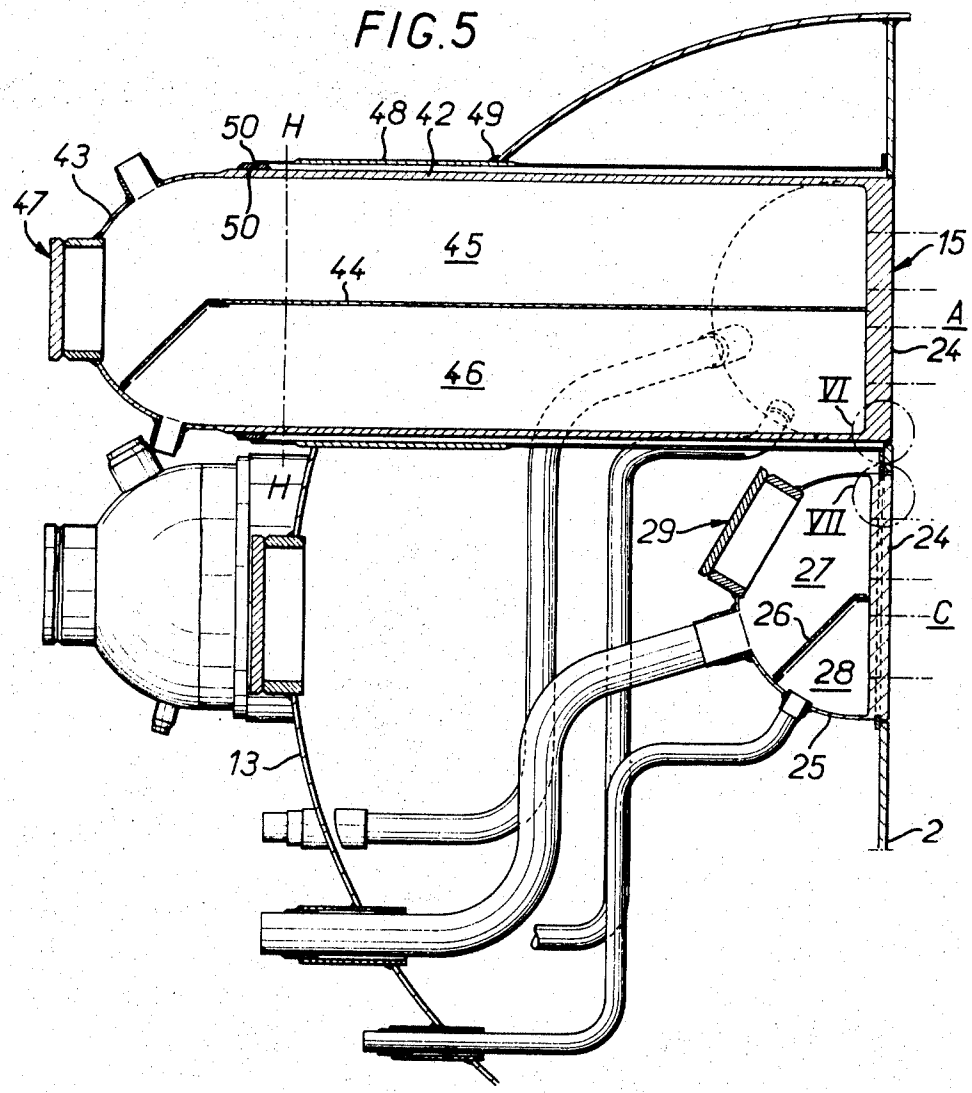


FIG.6

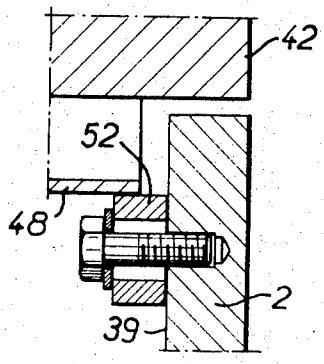


FIG.7

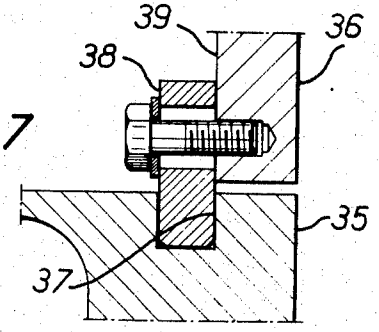


FIG.8

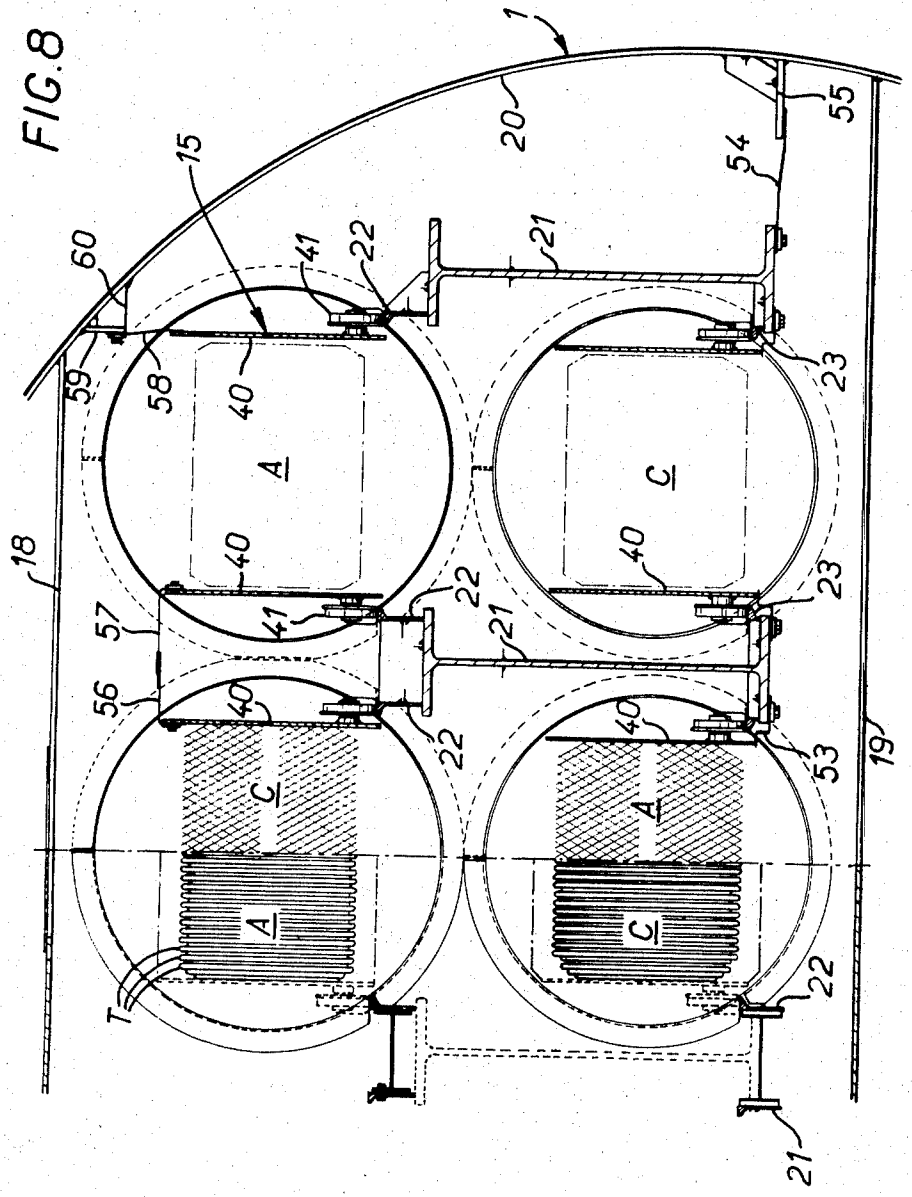


FIG. 9

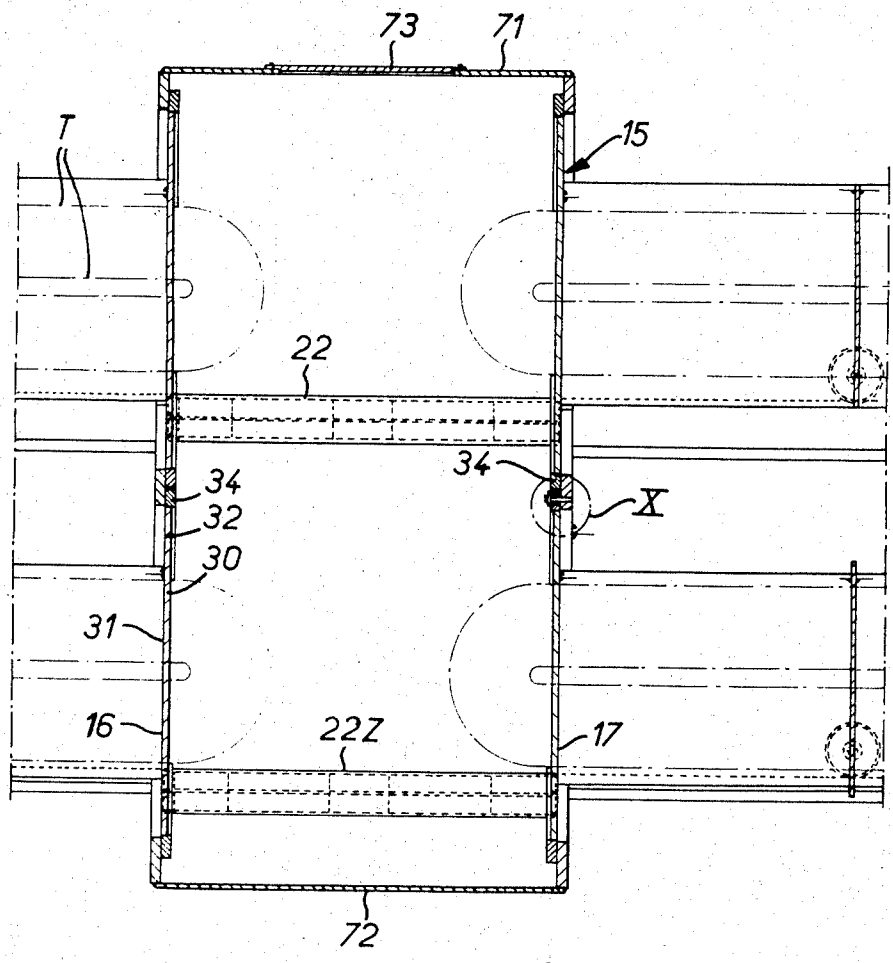


FIG. 10

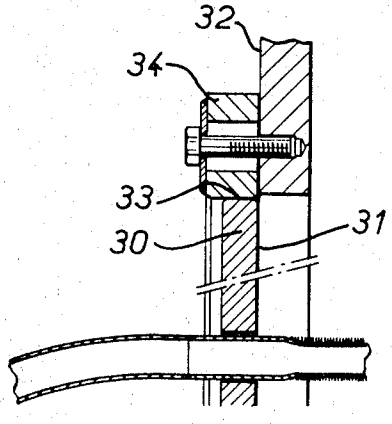


FIG. 11

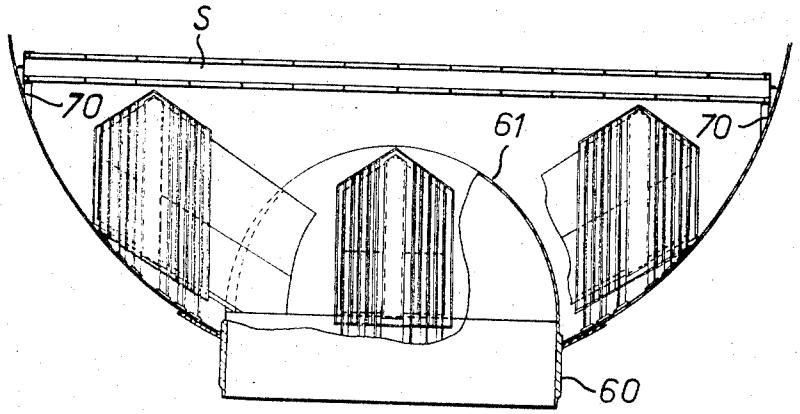


FIG. 12

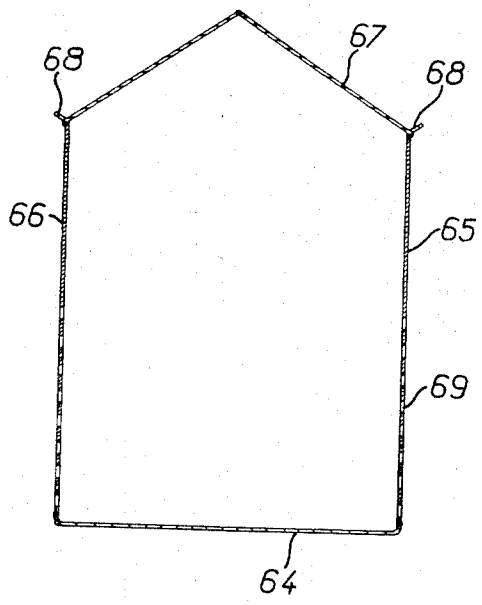
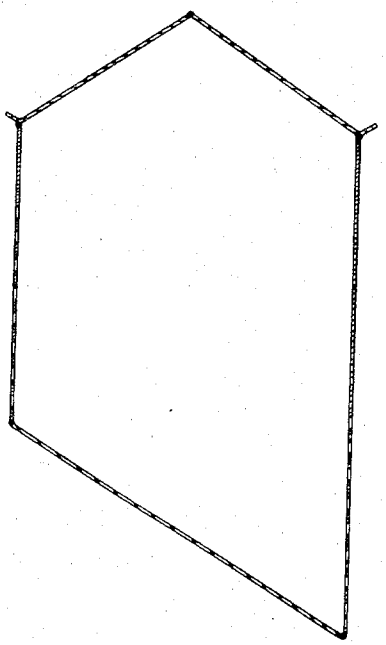


FIG. 13



APPARATUS FOR DRYING AND SUPERHEATING STEAM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to apparatus serving to remove water from a damp saturated steam and then to heat the resulting dry saturated steam in order to form superheated steam.

The invention applies particularly to thermal electricity generating installations which use steam as working fluid.

2. Description of the Prior Art

Superheater driers associated with these installations generally comprise a horizontally elongated cylindrical casing in which there are a bottom zone containing a wet steam distributor and a water extractor, and an upper zone in which the dry steam bathes a surface exchanger forming a superheater.

It is normally attempted to reduce the volume of these devices in order to reduce their cost, improve their operation, and facilitate their maintenance.

In steam power stations containing a single turbo-alternator unit served by a relatively large number of superheater driers (four to six for example), and particularly when superheating is effected in a single stage, it is found that the critical point, on which the volume of this equipment is mainly dependent, is situated in the drying portion, and attempts have been made to achieve the desired reduction of volume by improving the drying device.

Nevertheless, as the result of progress recently made in certain specialised fields of heavy boiler-making it is now possible to envisage only two superheating-drying devices, situated one on each side of the low pressure body of a high power turbine (for example 800 – 1,200 MWe). Furthermore, in this case the superheating is frequently effected in two stages, one being supplied with live steam and the other with steam tapped from the high pressure body of the turbine. In this case it is found that it is the superheater portion, with its large number of tubes, which primarily governs the volume of the apparatus. In addition it is found that this volume, even if reduced to the utmost, remains sufficiently great to entail a substantial complication of the problems of inspection, maintenance, and repair of the system of tubes, and also problems of strength involved by the provision of outlet apertures for the tubes. Suitable distribution of the wet steam and also the evacuation of the water extracted from it also entail difficulties, which become greater with increasing dimensions of the apparatus.

The object of the present invention is to provide an apparatus for drying and heating steam which overcomes these problems and, in particular, permits the selection of a smaller number of superheater-driers of high individual power in a given water vapour generation and utilisation installation. Another object of the invention is to provide a superheater permitting substantial reductions of volume of the superheater-drier appliances of the type described above, facilitating their supervision, maintenance, and repair, as well as the arrangement of their outlet apertures, more effectively feeding these appliances with wet steam, and more conveniently discharging the water extracted from this steam.

In known appliances of the above-mentioned type, the superheater is a bank of rectilinear tubes parallel to the axis of the shell in which they are accommodated. For reasons of construction and convenience this bank of tubes is given as compact a shape as possible so that, viewed in cross-section, its height dimension is equal or substantially equal to its width dimension. In apparatus of this kind it is customary to circulate the steam to be treated from bottom to top, causing it to pass in succession through the drier and the superheater, so that the space available for the latter is substantially greater in width than height. Another object of the invention is to provide an apparatus which takes advantage of this circumstance, without complicating the construction and does so by making the superheater in the form of a plurality of independent banks of tubes parallel to the axis of the shell and disposed side by side in the width of the shell.

SUMMARY

According to the invention an apparatus for drying and heating steam, comprising a horizontally elongated shell, a surface exchanger forming a superheater, inlet and outlet means in said casing for circulating the steam therein from bottom to top along a path successively passing through a moisture extractor and said surface exchanger, outlet apertures to said casing for these exchanger elements, said superheater being composed of a plurality of independent banks of tubes which are elongated in the longitudinal direction of said shell and in cross-section occupy less space in height than in width.

In one construction of this apparatus the superheater is divided not only in width but also in the direction of its length, and is in the form of a plurality of parallel rows, each of which is composed of a plurality of independent banks of tubes placed end to end over the entire length of the shell.

It is advantageous for each bank to be placed on a running track to facilitate its removal and replacement; according to another characteristic, the outlet apertures, each of which is reserved for one bank or one row of banks, are distributed in equal shares over the two end walls of the shell, thus substantially reducing the problems of construction of these walls, each of which is provided with only half the openings necessary for the entire superheater.

In one application the banks disposed at a plurality of levels form superimposed groups, each of which is associated with an individual source of heating fluid and which constitute a plurality of superheating stages.

A wet steam distributor of the invention is provided with at least one inlet passing through the bottom of the shell at an intermediate point on the latter and serving, on each side of that intermediate point, a plurality of feed ducts which have perforated walls and which are disposed in the lengthwise direction of the shell and are situated on each side of the transversal plane of the apparatus at the aforesaid admission point.

According to other characteristics of this distributor, the ducts are transversely independent of the shell and are situated at a distance from the inner face of the shell to permit the free flow of water along this face, and the top wall of each duct projects horizontally over its perforated walls, thus preventing the water which falls from the extractor from trickling along the perfo-

rated walls and overloading with moisture the steam to be treated.

The objects, characteristics, and advantages of the invention will moreover be clear from the description of the latter which will be given below, in connection with one embodiment selected as an example.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows in longitudinal axial section a superheater-drier of the invention;

FIG. 2 is a plan section along the line II—II in FIG. 1;

FIG. 3 is a diagrammatic end view in the direction of the arrow III in FIG. 1;

FIG. 4 is a diagrammatic cross-section along the line IV—IV in FIG. 1;

FIG. 5 illustrates on a larger scale and in greater detail an end portion of the apparatus, situated on the left in the view shown in FIG. 1;

FIGS. 6 and 7 show on a still larger scale two details of FIG. 5;

FIG. 8 is a partial cross-section on a larger scale, taken along the line VIII—VIII in FIG. 2 but limited to the portions of the apparatus situated above the horizontal sectional plane II—II;

FIG. 9 is a longitudinal axial section in elevation of the middle portion of the apparatus;

FIG. 10 shows on a larger scale a detail of construction relating to FIG. 9;

FIG. 11 is a partial cross-section on a larger scale, taken along the line IV—IV in FIG. 1 and limited to the bottom portion of the apparatus;

FIGS. 12 and 13 show wet steam distribu-tion ducts in cross-section and on a still larger scale.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Taken as a whole, the apparatus illustrated in the drawings comprises, inside a horizontally elongated casing V, a drier S, a wet steam distributor D, and a superheater E. The drier is a mattress of metal fabric disposed along a horizontal plane in the bottom half of the casing V, in such a manner as to divide into two unequal portions the entire space bounded by the cylindrical wall 1 of the casing V and by its end vertical partitions 2 and 3. The space situated beneath the drier S receives the distributor D, which is served by dry steam inlet connection 4, 5, and the upper space occupied by the superheater E is served by three dry steam outlet connections 6, 7, 8. A series of water drains 9 are disposed along the bottom generatrix of the shell 1.

The wet steam, entering through the connections 4, 5, and distributed by the distributor over the entire length of the apparatus, passes from bottom to top through the mattress S, which retains the water contained therein, and then bathes the superheater E, constituted by a tubular bank surface exchanger. The steam thus superheated is directed towards its utilisation point through the outlet connections 6, 7, 8.

The shell 1 is stiffened and surrounded on its outer face by two circular carrier frames 10, which transmit the loads of the apparatus to supports 11 with the aid of expansion bearings 12. At its two ends it terminates in two hemispherical domes 13 and 14 respectively, which are curved outwardly and which are connected to the shell 1 in vertical planes defined by the previously mentioned terminal partitions 2, 3. These partitions, welded over their entire periphery to the inner face of the shell, are each provided with six circular passage apertures 15 (FIG. 5), which are intended for six respective banks of tubes, to which further reference will be made hereinbelow.

Two middle vertical partitions 16, 17, closely spaced one on each side of the median transversal plane of the apparatus are each bounded (FIG. 8) by a top horizontal edge 18, a bottom horizontal edge 19, and two edges 20 in the form of arcs of circles, along which they are welded to the inner face of the shell. In each of these median partitions are provided six circular passage apertures 15 intended for the same purposes as the previously mentioned apertures 15.

Four horizontal beams 21 (FIG. 8) of double T section, situated at the same level and uniformly spaced apart, brace the partitions 2, 16 to which they are welded and which serve to support them. Four other horizontal beams 21 are similarly disposed between the partitions 17 and 3. All the beams are so situated as to leave free the openings 15 formed in their support partitions. We shall now limit ourselves to the half of the apparatus situated on the left in FIG. 1, the elements of which are likewise found in the right-hand half with the exception of certain arrangements, which will be indicated hereinbelow.

In FIG. 8 the beams 21 nearest the inner face of the shell each carry a running rail 22 on their upper flange, two rails 22 resting similarly on the top flange of each of the intermediate beams 21. All these rails, which pass through the space between the two middle partitions 16, 17, form together three upper running tracks which extend without interruption from the partition 2 to the partition 3. Three bottom running tracks are similarly formed by rails 22 suspended on the bottom flanges of the beams 21, or by rails 23 resting directly on these flanges.

The space bounded by the shell 1, the partitions 2, 16, and the mattress S receives six horizontally elongated banks of tubes which form half of the heat exchanger E intended to superheat the steam.

Three of these banks, designated by the reference C, are composed of tubes T bent into U-shape or hairpin shape, the bent portions of which project over the partition 16, penetrating into the space bounded by the two intermediate partitions 16, 17, while the ends of their parallel rectilinear branches are connected to a tubular plate 24 situated in line with the terminal partition 2 (FIG. 5) (the banks of tubes may also be constituted by straight tubes between two tubular plates). A hemispherical cap 25 forms together with the plate 24 a box divided by a partition 26 into two compartments 27 and 28 which serve respectively for the admission and discharge of a heating fluid, each U-tube being in communication by one of its two rectilinear branches with the compartment 27 and by its other rectilinear parts with the compartment 28. These two compartments are connected to service connections and piping, partly illustrated and not given references, which pass through the terminal dome 13 and which, since they may be of any known type, will not be described in greater detail. The cap 25 is provided with one or more inspection windows 29 provided with covers.

At the bent end of the bank (FIGS. 9, 10) the tubes pass through a circular plate 30 the outer face 31 of which is flush with the inner face 32 of the corresponding middle partition, while its peripheral edge 33, situ-

ated in the space between the two intermediate partitions **16, 17,** is surrounded by a sealing guide ring composed of a plurality of segments **34** bolted on the inner face **32** of the intermediate partition.

At the end of the straight branches of the bank (FIGS. **5, 6, 7**) the inner face **35** of the tubular plate **24** is flush with the inner face **36** of the end partition **2.** On its periphery the tubular plate **24** has a groove or slot **37** of rectangular profile, which receives a circular retaining collar composed of a plurality of segments **38** bolted on the outer face **39** of the end partition **2.**

As illustrated in FIG. **8,** each bank C has in cross-section a profile of space occupied of a rectangular shape. The tubes, fitted with spacing and support elements (not illustrated) transfer the loads of the bank to two vertical plates **40,** which frame it on both sides and which are provided with wheels **41** resting on one of the running tracks previously mentioned.

The other three banks of tubes on the left-hand half of the apparatus, which are designated by the reference A, comprise the same elements as the banks C (designated by the same reference numbers), except as regards the heating fluid admission and discharge box. The tubular plate **24** of a bank A is connected to a cylindrical sleeve **42** which, passing through the terminal dome **13,** projects to the outside and terminates in a hemispherical cap **43.** A partition **44** separates into two compartments **45, 46** for the admission and discharge of heating fluid respectively the space bounded by the elements **24, 42, 43,** which form a distribution box capable of passing freely through the corresponding hole **15.** The hemispherical cap **43** is provided with one or more inspection holes **47** with covers.

The sleeve **42** is surrounded by a coating sleeve **48,** which also passes through the dome **13** and projects to the outside. The sleeve **48** is welded on the one hand to the dome **13,** on the periphery **49** of the passage aperture provided in the latter, and on the other hand, by its outer edge **50,** to a spacer ring **51** welded on the other face of the sleeve **42.** At the tubular plate **24** the sleeve **48** is gripped in a sealing and guide ring composed of a plurality of segments bolted on the outer face **39** of the partition **2.** At its bent end the bank A is provided with sealing and guide elements **30, 34** similar to the elements bearing the same references with which the banks C are equipped, and the same applies to the support and running elements **40, 41.**

The banks of tubes are thus fixed at their outer end either by embedded collars **38** (banks C) or by welding **50** (bank A), but are free to expand in length under the action of temperature.

The six banks A, C of the left-hand half of the apparatus form two rows superimposed vertically and each composed of three banks placed side by side at the same level, each of them having its own source of heating fluid, the heating fluid of the upper row being hotter at the inlet than that of the bottom row.

In FIG. **8,** light Z-shaped sections **53** fixed by bolts on the bottom face of the beams **21** are in fluid-tight contact with the bottom edges of the plates **40,** which frame and support the banks of tubes. Thin plates **54** bolted on the bottom face of the side beams **21** are in fluid-tight contact with flats **55** welded on the inner face of the shell **1.** Thin plates **56, 57** overlapping with fluid-tight joints are fixed respectively by bolts to the top edges of two adjacent plates **40** belonging to two neighbouring banks of tubes in the upper row. In this same row the plates **40** nearest the inner face of the shell are overlapped in a fluid-tight manner at their top edge by thin plates **58** fixed on flats **59** welded to the shell. Other thin plates **60,** which are likewise fixed along one of their edges to the flats **59,** are in fluid-tight contact with the shell **1** by their opposite edge. The assembly formed by the elements **53** to **60,** the beams **21,** the plates **40,** and the shell **1** constitute a system of baffles which cause the dry steam passing from bottom to top through the mattress S to bathe in succession the banks of tubes of the bottom and top rows, by blocking the short-circuit paths provided on these banks.

The wet steam inlet connection **4** is situated approximately half-way along the length of the half of the apparatus situated on the left in FIG. **1.** This connection, which passes through the shell **1** at the bottom, is crowned by a hemispherical dome **61,** from which start six ducts which form two groups each of three ducts, these two groups being disposed one on each side of the transversal plane of the apparatus situated in line with the inlet connection **4** and defined by its trace YY (FIG. **2**).

Each group is composed of a central duct **62** and two side ducts **63.** The central duct, shown on a larger scale in FIG. **12,** is composed of a plurality of folded sheet metal elements welded to one another. It has a bottom **64,** two vertical side walls **65, 66** and a top wall **67** in the form of a roof with two sloping sides bordered by two gutters **68.** The vertical walls, which are set back in relation to the gutters **68,** are provided with perforations **69.** These same walls approach one another progressively starting from the inlet connection, in such a manner as to give the duct **62** a tapered shape in plan view (FIG. **2**) and to give it the form of a blind duct the outlet apertures of which are formed exclusively on its side walls **65, 66.**

The side ducts **63,** of which one is shown in FIG. **13,** are functionally similar to the duct **62** and differ from the latter only in respect of shape. Their elements corresponding to those of the duct **62** are designated by the same reference numerals accom-panied by the "prime" index, and their bottom **64'** is inclined as the consequence of the incurved shape of the bottom of the shell **1,** instead of being horizontal like the bottom **64** of the duct **62.**

As indicated above, the right-hand half of the apparatus contains the same elements as the left-hand half. In particular, it is provided with six banks of tubes, three of which are of the type A and three of the type C, and these banks are situated respectively in line with the six banks A and C of the left-hand part. The heat exchanger E is therefore composed of six rows of banks, each row being formed of two banks placed end to end. The banks are disposed in such a manner that each of these rows contains one bank of type A and one of type C. In each half of the apparatus the banks of one side are staggered in relation to those of the other type (FIG. **3**). As only the banks A are provided with apertures in the terminal domes **2, 3,** this arrangement has the effect on the one hand of reducing the number of these apertures in each of these domes, and on the other hand of keeping them apart as far as possible once the horizontal and vertical spacing of the banks have been fixed.

Service holes **74, 75** are provided in the terminal domes **13, 14.**

The mattress S, which is a light structure of known type, rests on the walls of the shell **1** with the aid of supports **70** (FIG. **11**).

The two middle partitions **16, 17** are connected together along their top edges by a plate **71** provided with a covered manhole **73,** and along their bottom edges by a plate **72.** These plates plates **71, 72** constitute baffles which prevent the steam from short-circuiting the banks of tubes and force it to pass through the latter before leaving the apparatus through the connections **6, 7, 8.**

The wet steam distribution ducts **62, 63** are entirely clear of the inner faces of the shell **1** and do not form an obtacle to the flow of water along these walls.

During operation the wet steam admitted at the connections **4, 5** is distributed by the ducts **62, 63** over the entire length of the apparatus, leaves these ducts through the perforations **69, 69'**, and passes through the mattress S from bottom to top, the uniform feeding of steam over the length of this mattress being assisted on the one hand by the arrangement of the ducts in a plurality of longitudinal rows distributed over the width of the apparatus, and on the other hand by the progressively decreasing cross-section of the ducts, starting from the point of admission of the wet steam.

The water given up by the wet steam in the mattress S falls either along the inner faces of the shell, which conduct it without obstruction to the drains **9,** or on the roofs **67, 67'** and thence to the gutters **68, 68'**, which conduct them in a falling slope to the dome crowning the corresponding admission connection **4** or **5,** and finally to the bottom of the shell and to the drains **9.** The water which falls off the mattress S is thus prevented from remixing with the wet stream which leaves the apertures **69, 69'.**

The steam freed from its water, after passing through the mattress S, successively bathes the bottom and top rows of tubular banks, is progressively heated by exchange of heat with the heating fluid of the bottom row and with the still hotter heating fluid of the top row, and passes out of the apparatus through the evacuation connections **6, 7, 8.**

The tubular plates and the connections of tubes to these plates are inspected directly from the outside, through the windows **47** in the case of the banks A. With regard to the banks C, the operator inspects them through the windows **29** after entering the apparatus through the manhole **74** or **75.**

A bank A is removed by cutting away the corresponding coacting sleeve **48** along the transversal plane HH (FIG. **5**) and removing the sealing and guide ring **34,** whereupon the bank is moved towards the outside on its running track. In order to dismantle a bank C, its fastening ring **38** and its sealing ring **34** are removed, the bank A situated in line with it is moved out in the manner described above, and it is moved along the same outward path along the track freed by the bank A.

The arrangements according to the invention therefore make it possible to provide only six outlet apertures for the twelve banks of tubes, and to provide only three of these apertures in each terminal wall of the apparatus. The multiplicity of banks increases their ease of handling and facilitates their maintenance, without unduly complicating the provision of outlet apertures for these banks.

It should be pointed out that the partitioning elements, such as terminal and middle partitions, sealing rings and the like, are arranged so as to prevent the short-circuiting of the banks of tubes by the steam to be superheated, and not in such a manner as to create differences of pressure on each side of these partitioning elements.

The invention is naturally in no way limited to the embodiment described and illustrated, this embodiment having been given solely by way of example.

I claim:

1. An apparatus for drying and heating steam, comprising a horizontally elongated shell, a surface exchanger forming a superheater, inlet and outlet means in said casing for circulating the steam therein from bottom to top along a path successively passing through a moisture extractor and said surface exchanger, outlet apertures to said casing for these exchanger elements, said superheater being composed of a plurality of independent banks of tubes which are elongated in the longitudinal direction of said shell and disposed side by side throughout the substantial width of the shell, said bank being of cross-section occupying less space in height than in width.

2. An apparatus according to claim **1,** characterised in that each said bank occupies only a fraction of the length of said shell.

3. An apparatus according to claim **2,** characterised in that said banks are distributed in rows, each of which is composed of a plurality of banks disposed end to end from one end to the other of the apparatus, each said row being provided with a single outlet aperture disposed in an end wall of said shell.

4. An apparatus according to claim **1,** characterised in that the outlet openings of said banks are distributed over the two end walls of said shell.

5. An apparatus according to claim **1,** characterised in that said banks of tubes are disposed at a plurality of levels.

6. An apparatus according to claim **5,** characterised in that said banks form a plurality of stages, each of which has an individual heating fluid inlet, to constitute a plurality of superheating stages.

7. An apparatus according to claim **5,** characterised in that said banks are distributed in vertically aligned groups of banks, said banks of one of these groups being provided with a common support formed by two longitudinal beams situated one on each side of this group.

8. An apparatus according to claim **1,** characterised in that each said bank is placed on a longitudinal running track.

9. An apparatus according to claim **8,** characterised in that each said bank is framed laterally by two plates in erect positions which serve to support it and which are provided with wheels resting on said running track.

10. An apparatus according to claim **9,** characterised by partitioning elements disposed in contact with the bottom and/or top edges of the side support plates of said banks and forming with said plates guide paths for the steam through said banks.

11. An apparatus for drying and heating steam, comprising a horizontally elongated shell, a surface exchanger forming a superheater, inlet and outlet means in said casing for circulating the steam therein from bottom to top along a path successively passing through a moisture extractor and said surface exchanger, outlet

apertures to said casing for these exchanger elements, said superheater being composed of a plurality of independent banks of tubes which are elongated in the longitudinal direction of said shell and disposed side by side in the width of the shell, said bank being of cross-section occupying less space in height than in width, at least those of the banks which are disposed side by side being all of the same length and forming a group equipped at each end with a flat erect partition providing for each bank a passage hole equipped with a perforated plate through which the tubes of said bank pass, said two erect partitions being connected fluid-tightly to said shell and forming between them a guide path for the steam through said banks of said groups.

12. An apparatus for drying and heating steam, comprising a horizontally elongated shell, inlet and outlet means for circulating the steam therein from bottom to top along a path passing in succession through a moisture extractor and a surface exchanger forming a superheater, a wet steam inlet comprising at least one inlet passing through the bottom of said shell at an intermediate point therein and feeding a plurality of distribution ducts which have perforated walls and extend in the longitudinal direction of said shell and disposed on each side of the transversal plane of the apparatus situated in line with said inlet point.

13. An apparatus according to claim **13**, characterised by a plurality of said longitudinal ducts is disposed side by side over the width of the apparatus.

14. An apparatus according to claim **13**, characterised by a plurality of such inlets which are spaced over the length of the apparatus, the ducts of each inlet extending only over a fraction of said length.

15. An apparatus according to claim **13**, characterised in that said perforated walls are side walls which are set back in relation to a top wall of the duct, said top wall forming a roof.

16. An apparatus according to claim **13**, characterised by water collection and evacuation gutters bordering the top walls of said ducts.

17. An apparatus according to claim **13**, characterised in that said ducts are situated at a distance from the wall of said shell, in such a manner as not to obstruct the flow of water along said wall.

18. An apparatus according to claim **1**, characterised by a plurality of water drains spaced out along the bottom generatrix of said shell.

19. An apparatus for drying and heating steam, comprising a horizontally elongated shell, a surface exchanger forming a superheater, inlet and outlet means in said casing for circulating the steam therein from bottom to top along a path successively passing through a moisture extractor and said surface exchanger, outlet apertures to said casing for these exchanger elements, said superheater being composed of a plurality of independent banks of tubes which are elongated in the longitudinal direction of said shell and in cross-section occupy less space in height than in width, at least those of the banks which are disposed side by side being all of the same length and forming a group equipped at each end with a flat erect partition providing for each bank a passage hole equipped with a perforated plate through which the tubes of said bank pass, said two erect partitions being connected fluid-tightly to said shell and forming between them a guide path for the steam through said banks of said groups, one of said perforated plates which is situated at the end of the respective bank closer to an end wall of said shell being connected to a sleeve passing through said end wall towards the outside, said one plate and said sleeve together forming a box collecting heating fluid and serving said bank, said sleeve being surrounded by a coacting sleeve which is connected by one of its ends to said partition so as to form a fluid-tight joint and fixed by its opposite end to said sleeve, while between said two ends it is fixed to said end wall.

20. An apparatus for drying and heating steam, comprising a horizontally elongated shell, inlet and outlet means for circulating the steam therein from bottom to top along a path passing in succession through a moisture extractor and a surface exchanger forming a superheater, a wet steam inlet comprising at least one inlet passing through the bottom of said shell at an intermediate point therein and feeding a plurality of distribution ducts which have perforated walls and extend in the longitudinal direction of said shell and disposed on each side of the transversal plane of the apparatus situated in line with said inlet point, said ducts having a polygonal profile, composed of two perforated vertical walls, a roof with gutters projecting beyond the line of said walls, and a floor situated at a distance from the bottom of said shell.

21. An apparatus for drying and heating steam, comprising a horizontally elongated shell, inlet and outlet means for circulating the steam therein along a path passing in succession through a moisture extractor and a surface exchanger forming a superheater, said moisture extractor being a foraminous wall extending lengthwise of the shell and dividing the chamber defined thereby into a lower space and a higher space with the latter containing the superheater, a wet steam inlet comprising at least one inlet passing through the bottom of said shell at an intermediate point therein and feeding a plurality of distribution ducts which have perforated walls and extend in the longitudinal direction of said shell within said lower space and disposed on each side of the transversal plane of the apparatus situated in line with said inlet point.

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