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LINEN DRIER

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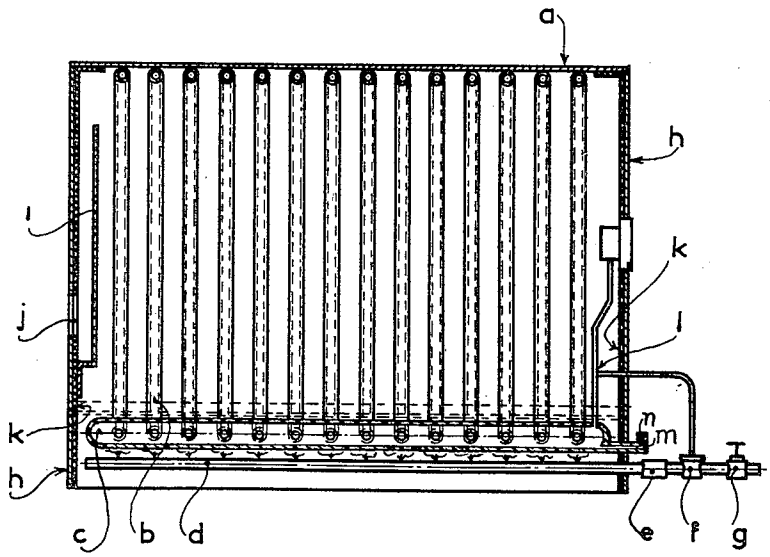


Fig. 1

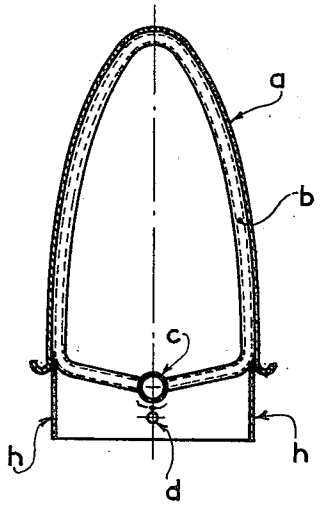


Fig. 2

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LINEN DRIER

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My invention has for its object a quick-acting linen drier operating under the combined action of steam and of the hot gases evolved by the source of heat which serves for actually vaporizing the steam, said drier incorporating means for adjusting the temperature under the control of steam pressure.

Accompanying drawings illustrate by way of example a preferred embodiment of a drier according to my invention. In said drawings:

Fig. 1 is a longitudinal cross-section of the drier;

Fig. 2 is a transverse cross-section thereof.

The main section of the drier illustrated comprises a convex plate *a* adapted to carry the material to be dried, said plate being formed by a heat-conductive material such as a metal sheet, preferably a sheet of aluminium 1 mm. thick. Said convex plate is bent into a substantially inverted U-shape so that its vertical cross-section assumes a curvilinear outline which is parabolic in the case illustrated; it is designed in a manner such that the wet article laid over the plate bears over it naturally under the action of gravity throughout its contacting surface extending from the top to the bottom of the plate without it being necessary to urge the articles into contact with the plate. In order to avoid the formation of any stains on the article to be dried and to cut out the necessity of a costly upkeep, the outer surface of the plate is submitted to a suitable protective treatment, e. g. it is covered by a coat of alumina, as obtained by the conventional anodic treatment in the case of the use of a sheet of aluminium. At each of its ends facing the ground, the plate is turned outwardly so as to form two small troughs which prevent the water dripping off the wet article from reaching the ground.

Underneath the convex plate and in the vertical plane of symmetry thereof, is positioned a boiler *c* formed of a seamless tube, the ends of which are formed by hemispherical caps.

Said boiler is connected with arcuate tubes made preferably of seamless steel tubes. The boiler feeds the tubes through the ends of the latter which open into the boiler obliquely at a suitable angle with reference to the horizontal. Each tube is bent at the inner surface of the plate and thereafter follows said surface. The surface of each tube is flattened in register with the inner surface of the plate and engages the latter. The outlines of the tubes correspond exactly with the outline of the cross-section of the plate while being slightly thicker by say 0.5 to 1 mm. so that, by reason of its parabolic outline, a stressing of the plate in a downward direction produces a perfect application of the latter onto the tubes which all assume exactly similar outlines.

The boiler is heated, in the example illustrated, by a gas burner *d* including means *e* for adjusting the proportions of gas and air, said means being controlled by a manometrically governed regulator *f* admitting gas into the burner in accordance with the value of steam pressure at the moment considered. This regulator is adjusted for

operation at a predetermined pressure according to the intended use of the drier beyond which pressure the regulator cuts out substantially the admission of gas and sets the burners in their pilot light condition. The connection of the regulators with the steam body is tapped at *l* off the right hand side of the boiler.

The system is closed along its two transverse surfaces and underneath the lower parts of the longitudinal surfaces by a casing *h* made of sheet metal and which is joined to the plate with the insertion of parts of asbestos board *k* or the like insulating material.

Inside the arrangement, a baffle *i* constrains the burnt gases to follow a longer path of travel before passing out the exhaust stack. Lastly, a stop cock *g* allows cutting off the feed of gas.

The opening *m* which serves for filling the boiler may be located at either end thereof and projects outside the casing; it lies at a level lower than that passing through the axis of the boiler so as to allow the latter to be filled at the utmost to one half of its capacity. Said opening *m* is closed by a plug *n* incorporating a cap of fusible material melting at a temperature of about 230° C.

The operation of the arrangement is as follows:

The steam produced inside the boiler or header *c* fills the arcuate tubes and heats the plate *a* through contact of the latter with the said arcuate tubes. However, between the input ends of the tubes registering with the boiler and the upper ends thereof, the steam cools slightly by reason of the heat transmitted by it to the convex plate. This loss in temperature is compensated for by the rising of the hot combustion gases which after sweeping over the boiler fill the upper part of the drier. This combined action produces a gradual and uniform heating of the plate. The flat outer surfaces of the tubes are in direct contact with said plate. The spacing between the successive tubes should be such that the distribution of heat throughout the plate is uniform and that no areas may show a substantial difference in temperature. Calculation shows that the optimum efficiency of the drier is obtained when the breadth of the free sections of the plate between two tubes is at the utmost equal to three times the breadth of the surface of contact between one of the tubes and the plate. Under such conditions, the steam having an actual operative pressure of 4.5 kgs. per sq. cm., which corresponds to a temperature of 156° C., produces a uniform plate temperature adapted to dry extremely wet linen within 3.5 to 4 minutes with a consumption of 335 litres of gas per hour and per sq. m. of plate surface.

The pressure-controlled regulator which is sensitive to differences of pressure of about 300 gr. per sq. cm., provides an extremely accurate adjustment of temperature throughout the plate. The temperature of the latter is such that the dried linen gives the impression of having been ironed, while it may be left 2 or 3 hours on the plate without any risk of burning. Hitherto, the temperatures used for drying linen were equal at a maximum to 90° C.; with the arrangement according to my invention, I may reliably obtain a speedy drying with a uniform temperature of plate of 120° C. with an allowance of 1.5° C. above or below said temperature.

The total volume of the tubes and of the boiler is such in the example illustrated that if the temperature rises up to 500° C., the steam pressure would be only 60 kgs. per sq. cm.; now, the fusible cap in the plug closing the boiler melts at about 230° C. and the test pressure of the different parts formed of seamless drawn steel tubes, is equal to about 75 kgs. per sq. cm.

The volume of water contained inside the boiler is extremely small and, as the water operates in a closed circuit, it need not be removed except at long intervals.

What I claim is:

1. A linen drier adapted to operate at a high speed, comprising an upwardly convex plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, a plurality of arcuate seamless steel tubes arranged in successive vertical cross-sectional planes of the convex plate and extending in contacting relationship with the inner outline of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, burners for heating the boiler, means controlled by the steam pressure in the arcuate tubes and adapted to control the operation of the heating burners and means for exhausting the combustion gases produced by the burners and entering inside the convex plate.

2. A linen drier adapted to operate at a high speed, comprising an upwardly convex plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, a plurality of arcuate seamless steel tubes arranged in successive vertical cross sectional planes of the convex plate and extending in contacting relationship with the inner outline of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, the outer surfaces of the tubes being flat so as to engage snugly the inner wall of the convex plate, means for heating the boiler, means controlled by the steam pressure in the arcuate tubes and adapted to control the operation of the heating means.

3. A linen drier adapted to operate at a high speed, comprising an upwardly convex plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material, the outline of said plate being rounded outwardly to allow the laying thereon of the articles to be dried, which articles adhere to said outer surface under the mere action of gravity, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, a plurality of arcuate seamless steel tubes arranged in successive vertical cross-sectional planes of the convex plate and extending in contacting relationship with the inner outline of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, means for heating the boiler, means controlled by the steam pressure in the arcuate tubes and adapted to control the operation of the heating means.

4. A linen drier adapted to operate at a high speed, comprising an upwardly convex plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material, having a treated outer surface preventing the staining of the articles laid thereon, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, a plurality of arcuate seamless steel tubes arranged in successive vertical cross-sectional planes of the convex plate and extending in contacting relationship with the inner outline of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, means for heating the boiler, means controlled by the steam pressure in the arcuate tubes and adapted to control the operation of the heating means.

5. A linen drier adapted to operate at a high speed, comprising an upwardly convex plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material,

the lower edges of the plate being outwardly incurved to form troughs adapted to collect the water dripping off the wet articles lying on the convex plate, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, a plurality of arcuate seamless steel tubes arranged in successive vertical cross-sectional planes of the convex plate and extending in contacting relationship with the inner outliner of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, means for heating the boiler, means controlled by the steam pressure in the arcuate tubes and adapted to control the operation of the heating means.

6. A linen drier adapted to operate at a high speed, comprising an upwardly convex outwardly parabolic plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, a plurality of arcuate seamless steel tubes arranged in successive vertical cross-sectional planes of the convex plate and extending in contacting relationship with the inner outline of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, means for heating the boiler, means controlled by the steam pressure in the arcuate tubes and adapted to control the operation of the heating means.

7. A linen drier adapted to operate at a high speed, comprising an upwardly convex plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, a plurality of arcuate seamless steel tubes arranged in successive vertical cross-sectional planes of the convex plate and extending in contacting relationship with the inner outline of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, fluid-operated means for heating the boiler, a pressure-controlled regulator submitted to the action of steam pressure so as to cut off at least the major part of the operative fluid fed to the boiler heating means.

8. A linen drier adapted to operate at a high speed, comprising an upwardly convex plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, means for feeding water to the boiler through an opening located at a level such that the capacity of the boiler is only filled to about one-half, a plurality of arcuate seamless steel tubes arranged in successive vertical cross-sectional planes of the convex plate and extending in contacting relationship with the inner outline of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, means for heating the boiler, means controlled by the steam pressure in the arcuate tubes and adapted to control the operation of the heating means.

9. A linen drier adapted to operate at a high speed, comprising an upwardly convex plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, means for feeding water to the boiler and including a safety plug and a cap of fusible material therein adapted to melt at a predetermined limit temperature to allow the water and

steam to pass out of the boiler, a plurality of arcuate seamless steel tubes arranged in successive vertical cross-sectional planes of the convex plate and extending in contacting relationship with the inner outline of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, means for heating the boiler, means controlled by the steam pressure in the arcuate tubes and adapted to control the operation of the heating means.

10. A linen drier adapted to operate at a high speed, comprising an upwardly convex plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, a plurality of arcuate seamless steel tubes arranged in successive vertical cross-sectional planes of the convex plate and extending in contacting relationship with the inner outline of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, burners for heating the boiler, means controlled by the steam pressure in the arcuate tubes and adapted to control the operation of the heating burners, means for exhausting the combustion gases produced by the burners and entering inside the convex plate, a baffle system adapted to constrain the combustion gases to follow a path of predetermined length on the inside of the plate and an exhaust stack through which the gases passing out of the baffle system are removed into the atmosphere.

11. A linen drier adapted to operate at a high speed, comprising an upwardly convex plate having a vertical plane of symmetry on which the articles to be dried are adapted to be laid and made of heat-conductive material, a boiler including a seamless tube the ends of which form hemispherical caps and extending underneath the plate in the vertical plane of symmetry of the latter, a plurality of arcuate seamless steel tubes arranged in successive vertical cross-sectional planes of the convex plate and extending in contacting relationship with the inner outline of said plate, last mentioned tubes opening into the boiler tube to either side of the plane of symmetry along oblique radii of the said boiler tube, means for heating the boiler,

means controlled by the steam pressure in the arcuate tubes and adapted to control the operation of the heating means, a casing extending over the lateral open surfaces of the plate and under the walls of said plate and a heat-insulating packing fitted between said plate and said casing.

12. A linen drier adapted to operate at high speed, comprising a plate of heat conducting material having its ends extending downwardly from its medial portion to form a hood having open sides and an outer convex surface on which articles to be dried are adapted to be laid, means closing the open sides of the hood, a steam boiler in said hood, a plurality of tubes connected to said boiler and having heat exchange contact with the inner surface of said plate, means for heating said boiler with gaseous combustion products, and means for passing the gaseous combustion products after contacting said boiler into direct heat exchange contact with the inner surface of said plate.

13. A linen drier adapted to operate at high speed, comprising a plate of heat conducting material having its ends extending downwardly from its medial portion to form a hood having open sides and an outer convex surface on which articles to be dried are adapted to be laid, means closing the open sides of the hood, a steam boiler in said hood, a plurality of tubes connected to said boiler and having heat exchange contact with the inner surface of said plate, means for heating said boiler with gaseous combustion products, means for passing the gaseous combustion products after contacting said boiler into direct heat exchange contact with the inner surface of said plate, and means responsive to the pressure of steam in the tubes to control the supply of hot combustion gases to said boiler and to the interior of the hood in contact with said plate.

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