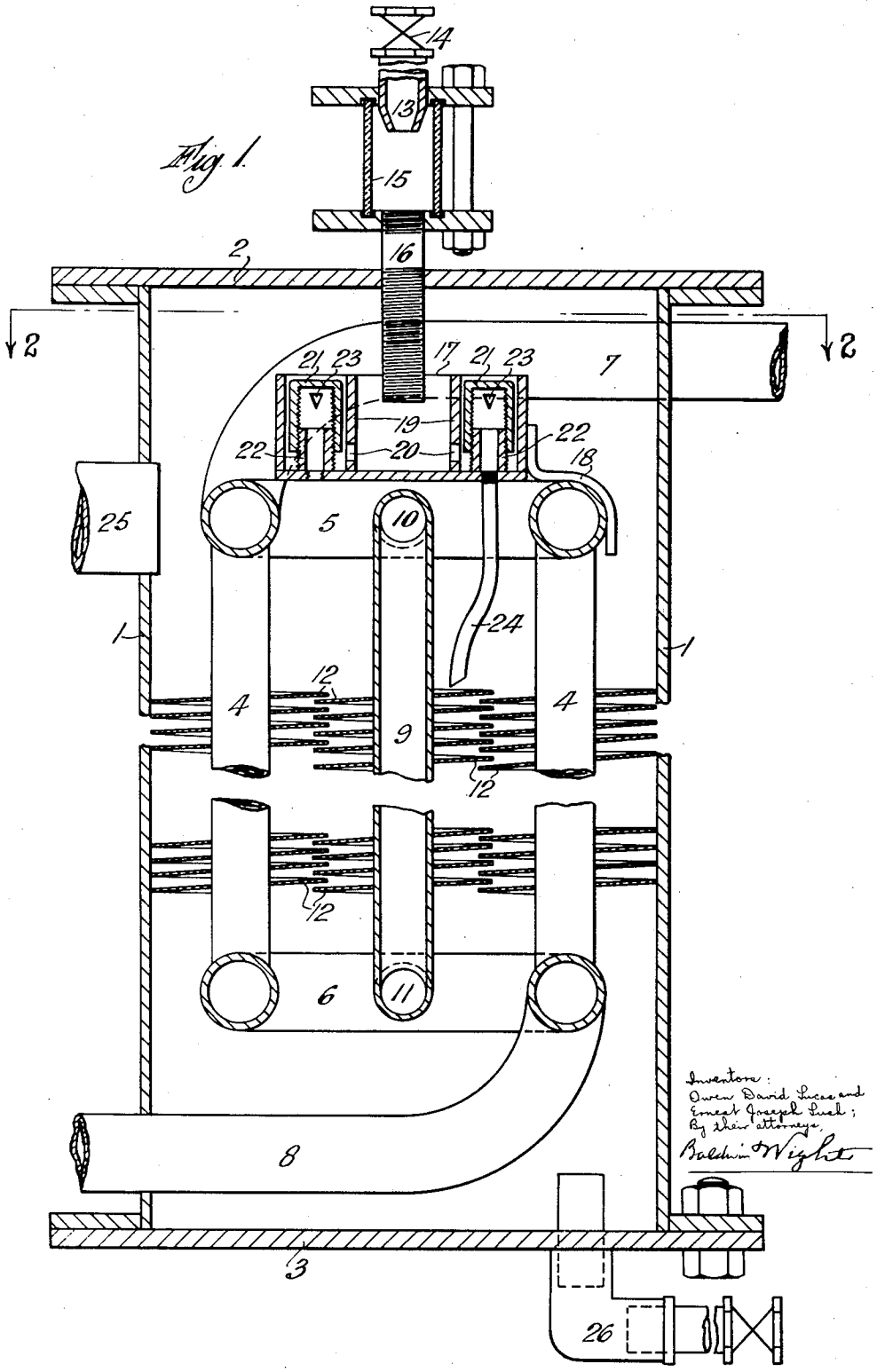
June 19, 1934. O. D. LUCAS ET AL 1,963,857

HEAT EXCHANGER

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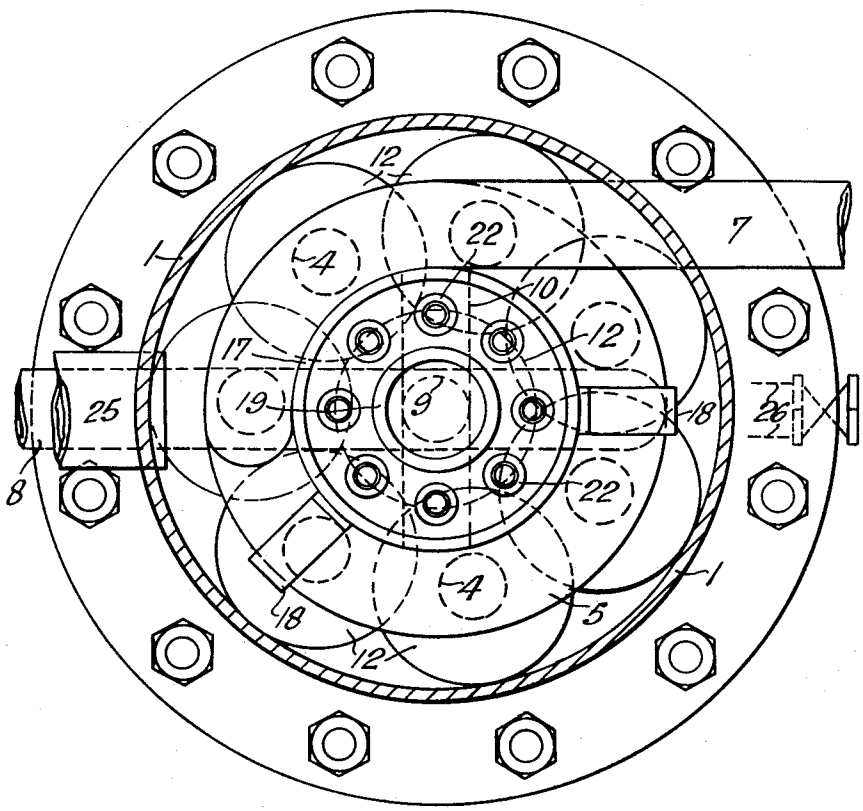
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Fig. 2.



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HEAT EXCHANGER

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Application November 22, 1933, Serial No. 699,293
In Great Britain November 22, 1932

4 Claims. (Cl. 257—181)

This invention relates to improvements in heat interchangers and particularly to apparatus for vaporizing or distilling liquids. The apparatus is of the type in which the liquid to be vaporized or distilled is caused to trickle over a heated surface.

According to the invention, the apparatus comprises a nest of gilled tubes adapted to be internally heated, for example by a fluid heating medium circulating through the tubes, and arranged and disposed in relation to means for supplying the liquid to be vaporized or distilled so as to receive upon their surface in the upper region a distributed delivery of the liquid and so as not to afford the liquid a free vertical fall down between the tubes. Thus the apparatus may, according to the invention, comprise a nest of helically gilled vertically disposed tubes arranged so as to receive upon their surface from above a distributed delivery of the liquid, the gills of adjacent tubes overlapping so as to prevent liquid from falling freely down between the tubes.

Preferably the distributor for the supply of liquid is one which comprises a reservoir communicating through adjustably arranged orifices with delivery pipes leading to the various gilled tubes.

The apparatus may be used at, above or below atmospheric pressure.

The invention is illustrated by way of example in the accompanying drawings, of which Figure 1 is a vertical section taken on the line 1—1 of Figure 2, and Figure 2 is a horizontal section taken on the line 2—2 of Figure 1.

Referring to the drawings, the apparatus comprises a cylindrical casing 1 with top and bottom covers 2 and 3 respectively. Within the casing is mounted a nest of vertical tubes 4 connected at the top and bottom respectively to ring headers 5 and 6. Header 5 communicates with an outlet pipe 7 and header 6 communicates with an inlet pipe 8 whereby the circulation of a fluid heating medium through the tubes in parallel is provided for. It will be understood, however, that other connections may be made so that the flow is in series or in series-parallel. The centre tube 9 of the nest is connected to cross pipes 10 and 11 leading across the top and bottom ring headers respectively.

Each tube is provided with gills 12 each formed as a helix. The gills of adjacent tubes overlap, i. e. are interjacent, so as to leave no free vertical passage down between the tubes.

The means for supplying the liquid to be vaporized or distilled within the casing comprises a feed pipe 13 with a control cock 14, a sight feed chamber 15 and a pipe 16 leading through the top cover of the casing to a reservoir or trough 17, carried by means of lugs 18 on top of the upper ring header 5. The reservoir or trough has an inner circular wall 19 with apertures 20 spaced around it. Liquid may thus pass from the centre portion of the trough to the annular channel outside the inner wall. Within the annular channel are mounted at spaced intervals a number of devices comprising caps 21 screwed upon hollow plugs 22, the said caps each having a V shaped slot 23. Delivery pipes lead from the plugs 22 to the various gilled tubes. One such pipe is indicated at 24. The other pipes corresponding to the other gilled tubes are not shown but they are similarly arranged.

The adjustable caps, with the V shaped slots, disposed in the annular channel of the reservoir or trough enable the distribution of liquid to the various delivery pipes and thence to the various gilled tubes to be adjusted and equalized.

In operation, heated medium, which may be water, steam or other fluid according to the temperature of vaporization or distillation required, is circulated through the nest of tubes thereby heating the tubes and their gills.

The liquid to be vaporized or distilled is fed to the reservoir and is thence delivered to the top gills of the several tubes through the means hereinbefore described. The liquid will then follow a tortuous and elongated path in a downward direction. There is no free vertical path, and the liquid will travel helically down the gills and to some extent will pass from the gills of one tube to the gills of an adjacent tube. In this way the heating surface contact is rendered extensive and a large amount of heat will be transferred; temperature gradients are comparatively small. The liquid in its fall down through the gill system is vaporized, or a particular fraction of the liquid is vaporized, and the vapours pass upwards and go out through the vapour outlet 25. The residual liquid or unvaporized fraction or fractions will pass to the bottom of the casing whence it may be withdrawn through the outlet pipe 26.

What we claim is:—

1. Apparatus for vaporizing or distilling liquids by the trickling of liquid over a heated surface, comprising in combination a nest of gilled tubes adapted to be internally heated and liquid supply means adapted to deliver liquid upon the upper region of the surface of said gilled tubes, the said gilled tubes being arranged and disposed so as not

to afford the liquid a free vertical fall down between the tubes.

2. Apparatus for vaporizing or distilling liquids by the trickling of liquid over a heated surface, comprising in combination a nest of helically gilled vertically disposed tubes adapted to be internally heated and liquid supply means adapted to distribute liquid upon the upper parts of said gilled tubes, the gills of adjacent tubes overlapping so as not to afford the liquid a free vertical fall down between the tubes.

3. Apparatus for vaporizing or distilling liquids by the trickling of liquid over a heated surface, comprising in combination a nest of helically gilled vertically disposed tubes adapted to be internally heated and arranged so that the gills of adjacent tubes overlap, a reservoir for liquid, and delivery pipes in adjustable communication with said reservoir and leading to the upper parts of the various gilled tubes.

4. Apparatus for vaporizing or distilling liquids by the trickling of liquid over a heated surface, comprising in combination a nest of helically gilled vertically disposed tubes adapted to be internally heated and arranged so that the gills of adjacent tubes overlap, a reservoir for liquid, devices adjustable in height and exposing orifices in said reservoir, and delivery pipes leading to the upper parts of the various gilled tubes and communicating with said reservoir through said devices and the orifices therein.

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