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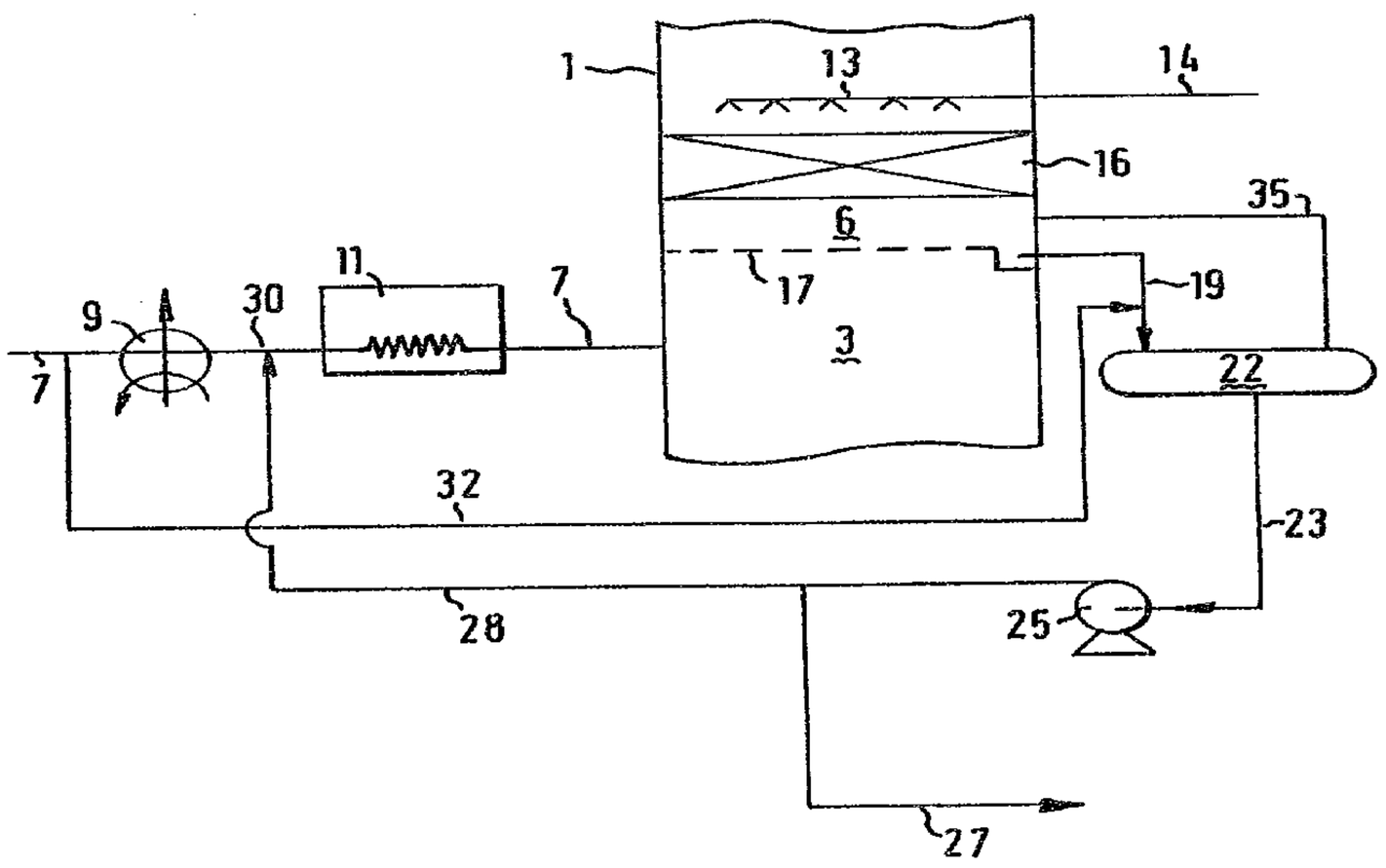
(54) **PROCEDE DE DISTILLATION SOUS VIDE**
(54) **VACUUM DISTILLATION PROCESS**



(57) Vacuum distillation process comprising supplying feed (7) to a furnace (11), passing heated feed comprising vapour and liquid from the furnace (11) into a distillation column (1) operating at a subatmospheric pressure, allowing vapour to rise inside the distillation column (1), contacting the rising vapour with a de-entrainment device (16) to remove entrained liquid from the rising vapour, spraying wash liquid (13) on the de-entrainment device (16), passing wash liquid from the distillation column (1) to a vessel (22), and withdrawing wash liquid from the vessel (22), wherein the wash liquid is cooled prior to being withdrawn from the vessel (22).

A B S T R A C T

VACUUM DISTILLATION PROCESS

Vacuum distillation process comprising supplying feed (7) to a furnace (11), passing heated feed comprising vapour and liquid from the furnace (11) into a distillation column (1) operating at a subatmospheric pressure, allowing vapour to rise inside the distillation column (1), contacting the rising vapour with a de-entrainment device (16) to remove entrained liquid from the rising vapour, spraying wash liquid (13) on the de-entrainment device (16), passing wash liquid from the distillation column (1) to a vessel (22), and withdrawing wash liquid from the vessel (22), wherein the wash liquid is cooled prior to being withdrawn from the vessel (22).

(Figure)

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VACUUM DISTILLATION PROCESS

The present invention relates to a vacuum distillation process for distilling a feed containing hydrocarbons, which feed has a temperature in the range of from 380 to 425 °C, at a subatmospheric pressure in the range of from 650 to 5 200 Pa. The feed is sometimes referred to as long residue.

Such a vacuum distillation process comprises supplying feed to a furnace, passing heated feed comprising vapour and liquid from the furnace into a distillation column operating at a subatmospheric pressure, allowing vapour to rise inside the distillation column, contacting the rising vapour with a de-entrainment device to remove entrained liquid from the rising vapour, spraying wash liquid on the de-entrainment device, passing wash liquid from the distillation column to a vessel, and withdrawing wash liquid from the vessel.

In the known process the wash liquid is withdrawn from the vessel by means of a pump. It was found, however, that cavitation occurred in the pump, which reduced the pump's life considerably. A reason for the cavitation was found to be the high temperature of the wash liquid. This high temperature of the wash liquid can be caused by higher feed inlet temperatures which are being applied. Such higher feed inlet temperature are made possible by employing the vacuum distillation device as described in British patent application No. 89 03 007.6 filed on 10th February, 1989.

It is an object of the present invention to provide a vacuum distillation process in which the chance of cavitation is reduced considerably.

According to the present invention there is provided vacuum distillation process comprising supplying feed to a furnace, passing heated feed comprising vapour and liquid from the furnace into a distillation column operating at a subatmospheric pressure, allowing vapour to rise inside the distillation column, contacting the rising vapour with a de-entrainment device to remove entrained liquid from the rising vapour, spraying a wash liquid on the de-entrainment device, passing the wash liquid from the distillation column to a vessel, and withdrawing a wash-liquid-containing-mixture is cooled prior to being withdrawn from the vessel by mixing the mixture with part of the feed withdrawn from the feed upstream the furnace.

Cooling the wash-liquid-containing-mixture can be carried out by mixing the mixture with liquid having a lower temperature, wherein mixing can be done in the vessel or in the conduit connecting the distillation column and the vessel through which the wash-liquid-containing-mixture is passed to the vessel.

The cooling liquid can be part of the wash-liquid-containing-mixture which is removed from the vessel and cooled in a separate cooler. However, in order to save energy in cooling the wash-liquid-containing-mixture, the mixture is

cooled by mixing it with part of the feed withdrawn from the feed upstream the furnace prior to heating.

Thus in the process according to the present invention cooled wash liquid is present in the vessel. As a result thermal degradation of the wash liquid is reduced considerable.

The invention will now be described by way of example in more detail with reference to the accompanying figure showing schematically part of a longitudinal section of a distillation column 1, including an inlet section 3 and a wash section 6 arranged above the inlet section 3. Please note that the distillation column 1 further includes a top section and a bottom section which are not shown in the figure.

Into the inlet section 3 debouches feed supply conduit 7 which passes through preheater 9 and furnace 11.

The wash section 6 comprises a sprayer 13 provided with a wash liquid supply conduit 14, a de-entrainment device 16 and a draw-off tray 17. Removal conduit 19 connects the draw-off tray 17 to vessel 22. The de-entrainment device comprises trays, packing or other equipment suitable to remove liquid from a vapour.

During normal operation feed passing through supply conduit 7 is preheated in preheater 9 and further heated in furnace 11 to vaporize part of the feed. Heated feed comprising vapour and liquid is passed from the furnace 11 into the inlet section 3 of the distillation column 1. Which distillation column 1 operates at a subatmospheric pressure.

Liquid drops downwards and is collected in the bottom section (not shown) from which the liquid is removed. Vapour rises inside the distillation column 1 to the top section (not shown) from which the vapour is withdrawn by means of a vacuum pump such as a steam ejector.

The rising vapour passes through the wash section 6 and in the de-entrainment device 16 entrained liquid drops are separated from the rising vapour.

Wash liquid is sprayed by sprayer 13 on the de-entrainment device 16 to remove entrained liquid droplets therefrom. As a heavy components collected on the de-entrainment device 16 are washed away before substantial cracking of heavy components can occur.

Wash liquid and removed liquid are collected on the draw-off tray 17 from which the wash liquid containing mixture is removed through removal conduit 19.

The wash liquid containing mixture is passed to vessel 22 from which mixture is withdrawn through conduit 23 by means of pump 25. Withdrawn mixture liquid can be pumped to a storage (not shown) through conduit 27 for further use. Alternatively, to enhance the distillation recovery at least part of the withdrawn mixture can be supplied through conduit 28 to the feed in the feed supply conduit 7 at a joint 30 arranged at a place in the feed supply conduit 7 at which the temperature of the feed is about equal to the temperature of the withdrawn mixture or downstream the last element of preheater 9.

A part of the feed having a temperature which is lower than the temperature of the mixture entering into removal conduit 19 is supplied through conduit 32 to removal conduit 19 in which the part of the feed is mixed with the mixture to cool it. Suitably the amount is between 0.10 and 1.25 kg per kg of wash liquid containing mixture supplied to the vessel. The part of the feed used for cooling is separated from the feed upstream furnace 11.

The amount of feed mixed with wash liquid containing mixture is such that the temperature of the mixture is just below the temperature at which the liquid will cause cavitation in the pump 25.

To make the pressure in the vapour space of the vessel 22 substantially equal to the pressure in the

distillation column 1, the vapour space is connected to the interior of the distillation column 1 by means of line 35.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. Vacuum distillation process comprising supplying feed to a furnace, passing heated feed comprising vapour and liquid from the furnace into a distillation column operating at a subatmospheric pressure, allowing vapour to rise inside the distillation column, contacting the rising vapour with a de-entrainment device to remove entrained liquid from the rising vapour, spraying a wash liquid on the de-entrainment device, passing the wash liquid from the distillation column to a vessel, and withdrawing a wash-liquid-containing-mixture from the vessel, wherein the wash-liquid-containing-mixture is cooled prior to being withdrawn from the vessel by mixing the mixture with part of the feed withdrawn from the feed upstream the furnace.

2. Vacuum distillation process as claimed in claim 1, further comprising supplying at least part of the wash-liquid-containing-mixture from the vessel to the feed upstream the furnace.

3. Vacuum distillation process as claimed in claim 1 or claim 2, wherein the amount of feed used to cool the wash-liquid-containing-mixture is between 0.10 and 1.25 kg per kg of mixture supplied to the vessel.

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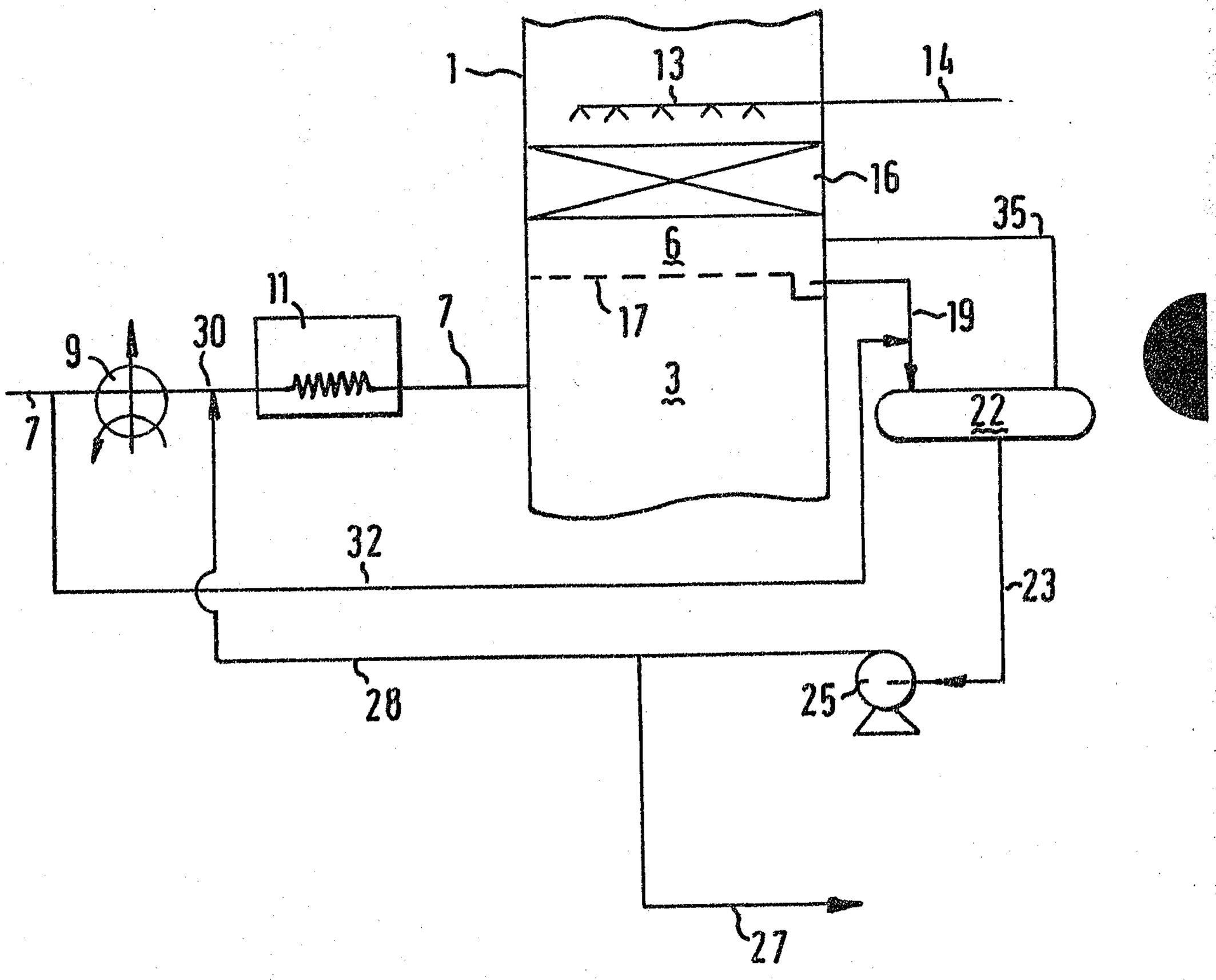
PATENT AGENTS



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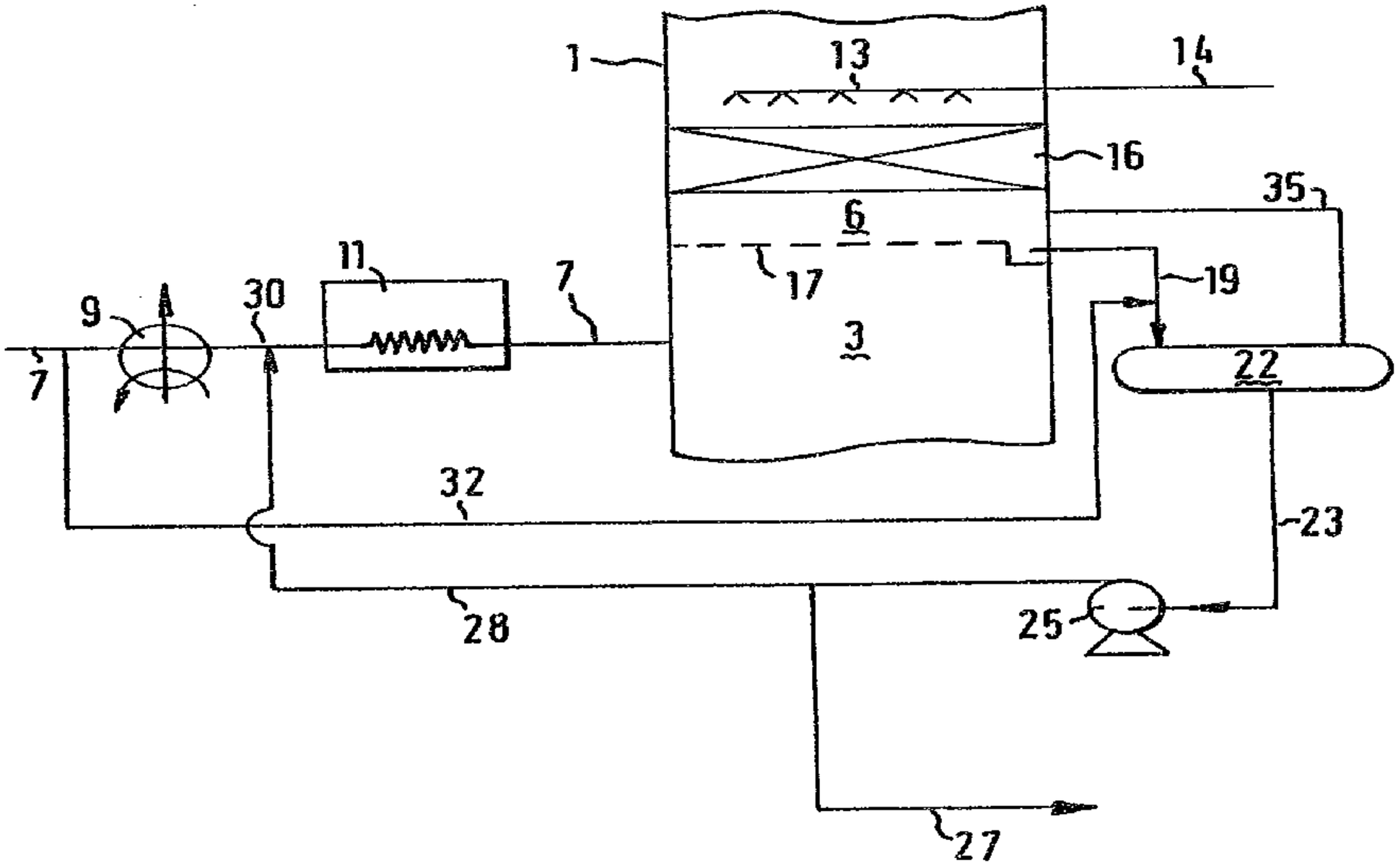
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