

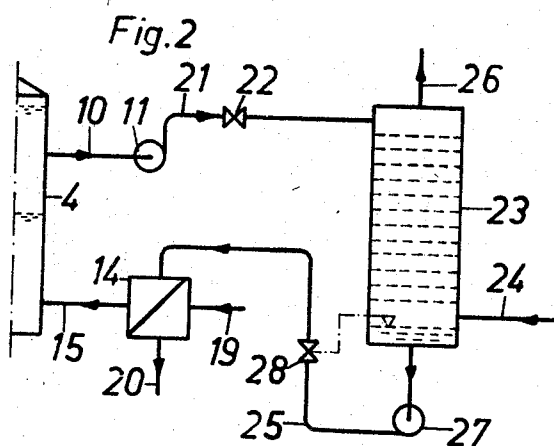
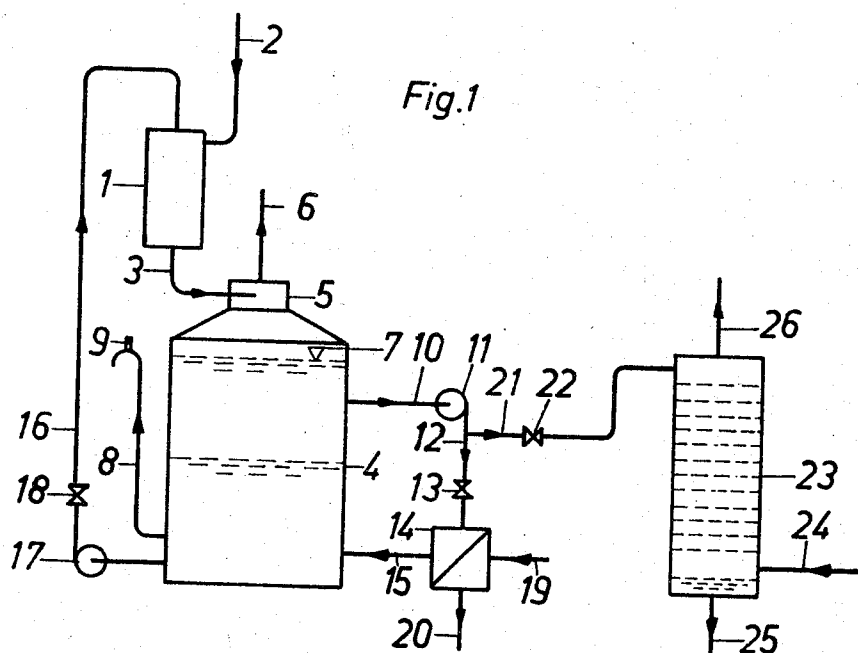
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METHOD OF CONDENSING BLOW-OFF STEAM IN SULPHATE PULPING

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METHOD OF CONDENSING BLOW-OFF STEAM IN SULPHATE PULPING

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1 Claim. (Cl. 55—48)

The present invention relates to the condensation of steam, herein referred to as blow-off steam, which is released at the blowing of a sulphate pulping digester. This blow-off steam contains noncondensable gases such as hydrogen sulphide, mercaptans, etc. which are absorbed by the blow-off steam condensate but cannot be allowed to accompany the condensate through the exhaust to the surroundings without substantial disadvantages.

The main object of the invention is to purify, refine or clean the blow-off steam condensate by evaporating these gases out of the condensate in the particular case where the blow-off steam is condensed during the blowing in a known and much used type of blow-off steam condenser system. In this system the hot condensate is fed to the upper part of an accumulator in which it is accumulated with such circulation that the hot condensate is collected in the upper part of the accumulator while the cooled condensate is collected in the lower part of the accumulator. From the lower part the cooled condensate is circulated as a cooling medium for the condensation of the steam whereby the cooled condensate is reheated and returned to the upper part of the accumulator.

The invention is characterized mainly in that the accumulated blow-off steam condensate is conducted in a hot condition from the upper part of the accumulator without material cooling to an evaporator where noncondensable gases contained in the condensate are evaporated in a known manner by means of a suitable evaporating medium, whereupon the cleaned or purified blow-off steam condensate is conducted out of the combined blow-off condenser-evaporator system.

The invention will now be described more fully below with reference to the accompanying drawing in which:

FIG. 1 illustrates a condenser and evaporator set-up for practising the invention and FIG. 2 illustrates a modified part of the arrangement according to FIG. 1.

Each figure takes the form of a flow diagram intended only to set out an exemplary embodiment without limiting the invention. Identical elements in the figures are indicated by the same reference numerals.

In FIG. 1 numeral 1 indicates a condenser usually of the radiating type in which blow-off steam, which is fed through conduit 2, is condensed and from which the condensate thus formed is conducted through conduit 3 to the upper part of an accumulator 4 by way of a separator section 5. In this separator section of the accumulator the condensate is separated from any residual steam and gases not absorbed by the condensate. This residual steam and gas is led off through conduit 6 and possibly through an aftercondenser which is often used but not shown in the figure. The condensate is collected in the accumulator to a maximum level 7 determined by outlet 8 which extends from the bottom part of the accumulator to this level where it is connected to the atmosphere by connection 9. The condensate collected in the accumulator is circulated from the upper to the lower part of the accumulator through an external path consisting of conduit 10, pump 11, conduit 12, control valve 13, indirect cooler 14 and conduit 15. Thereby the condensate is stratified so that hot condensate is collected in the upper part of the accumulator and cooled condensate is collected in the

lower part. At each blow-off the required amount of condensate is pumped by pump 17 from the lower part of the accumulator through conduit 16 and control valve 18 to act as a cooling medium for condenser 1. There the condensate is reheated in direct contact with the blow-off steam and is led back through conduit 3 to the accumulator together with the newly formed condensate from the blow-off steam. The cooling medium for cooler 14 is supplied through conduit 19 and discharged through conduit 20. These devices represent the essential parts of the known blow-off condensed system to which the invention relates. Those skilled in the art know the customary details, such as the previously mentioned aftercondenser and also automatic control means, which have been omitted from the drawing in order to avoid unnecessarily complicating the description with details not essential to the invention.

The devices, which are directly required for practicing the invention consist of a branch conduit 21 with control valve 22 leading from conduit 12 through which hot condensate is fed to evaporator 23 which includes inlet 24 for the gaseous evaporating medium, outlet 25 for clean or purified condensate and outlet 26 for the exhaust gases consisting of noncondensable gases from the condensate mixed with the evaporating medium.

These devices are utilized according to the invention so that the amount of hot condensate circulated by pump 11 through cooler 14 is considerably greater than the amount of newly formed condensate.

All of the condensate which shall be removed from the system via the evaporator and outlet 25 is taken out of the amount of hot condensate circulated by pump 11. It is essential for the invention that the condensate arrives at the evaporator in a hot condition. For this reason the conduit 21 should be as short as possible and/or well insulated. The essential advantage is that evaporating can be carried out at high temperature and thus with high effect. Also the evaporating medium which for example can be air taken from the atmosphere, is supplied at low temperature by means of a blowing fan. This results in the lowest possible operating costs and is especially suitable of the noncondensable gases are to be recovered out of the exhaust gases from the evaporator for use in pulp production. These noncondensable gases can be recovered by absorbing them in some process fluid, for example white liquor.

In the modification according to FIG. 2 all the condensate passing through pump 11 is pumped to the evaporator and is returned to accumulator 4 by pump 27 through conduit 25 with control valve 28 via cooler 14 and conduit 15. Control valve 28 is governed by the liquid level in the lower part of the evaporator. The advantage of using this path for conducting the condensate is that the accumulator will contain cleaned, cooled condensate which has a greater ability to absorb the noncondensable gases out of the blow-off steam when the condensate and the steam are fed to condenser 1. In this case all the condensate which is to be removed from the system can be allowed to leave through outlet 8 (FIG. 1) but naturally a separate outlet can also be arranged in another place of the circulation path where the condensate is also clean, possibly in front of cooler 14.

A secondary, but not unimportant advantage of the invention, is that the same evaporator utilized for the blow-off steam condensate can at the same time be utilized also for other condensates resulting from sulphate pulping. Some of these other condensates, especially the digester condensate, could be suitably cleaned through evaporating in which the heat supplied by the blow-off steam contributes to the purifying of these condensates.

What I claim is:

In the method of condensing blow-off steam relieved during the blow-down of a sulphate pulp digester, in which said blow-off steam, containing non-condensable gases, is condensed in a direct-contact condenser and is thereafter cooled, the hot liquid discharged from the condenser, which consists of a mixture of the cooling liquid supplied to the condenser and the blow-off steam condensate produced therein, containing non-condensable gases absorbed from the blow-off steam by the cooling liquid in the course of the condensation, said hot liquid after cooling being recirculated to the condenser as cooling liquid therefor, the improvement which comprises subjecting said hot discharge liquid, before the cooling thereof, to a process by which a substantial portion of the non-condensable gas contained in said liquid is removed therefrom, and, after cooling said thus treated discharge liquid, supplying it in its substantially degassed form to the direct-contact condenser as the cooling medium therefor, the thus supplied cooling liquid absorbing a substantial part

of the non-condensable gases in the blow-off steam which it encounters in the direct-contact condenser.

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