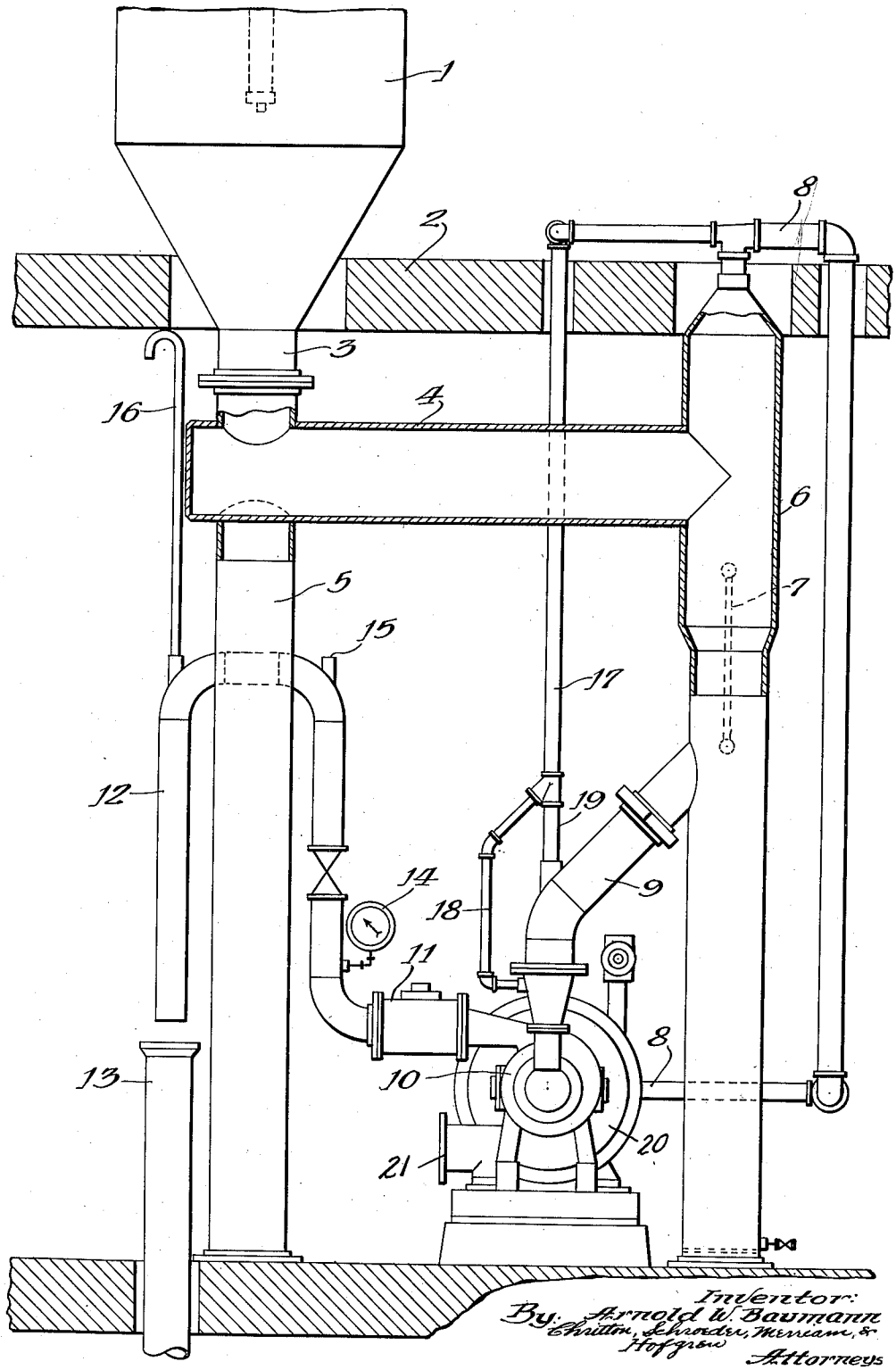
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CONDENSATE SEPARATOR

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CONDENSATE SEPARATOR

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4 Claims. (Cl. 183—34)

1

This invention relates to condensers of the type used in milk condensing plants, and more particularly to improved apparatus for removing condensate and maintaining a high vacuum in the condenser.

The primary object of the invention is to provide an improved piping unit for separating the gases from the condensate, so that a dry vacuum pump may be used which will not have to handle entrained droplets, and a condensate discharge pump will not have to handle non-condensable gases.

Heretofore, a great many milk evaporators have been equipped with parallel flow condensers having a wet vacuum pump of the reciprocal type which handles both water and air. However, these pumps were not efficient, and a high vacuum could not be obtained. Because of the air and non-condensable gases present in the water spray throughout the condenser, there was usually a temperature difference of from 20 to 30° F. between the vapor and condensate.

By the present invention a dry vacuum pump and a centrifugal condensate pump can be used in a parallel flow condenser, with the result that a much higher vacuum may be maintained in the evaporator and less condensing water is required. A terminal difference in temperature of the gas and water may be about 10° F.

In order to accomplish this desired result, an efficient water and gas separator is required, and that is one of the objects of the present invention.

The invention is illustrated in a preferred embodiment in the accompanying drawing, in which the apparatus is shown in a fragmentary elevational view which is partially in section and partially diagrammatic.

In the embodiment illustrated, a parallel flow condenser 1 is shown extending through and above a second floor 2. A short flanged pipe 3 connects the bottom of the condenser with a flume-like cylindrical conduit 4 which is supported beneath the condenser by a supporting column 5.

The conduit 4 is pitched or inclined slightly towards a vertical header 6 whose lower portion serves as a liquid receiver for condensate flowing from the conduit 4. A water gauge, indicated by dotted lines 7, will show the height of liquid in the header, and the upper portion of the header has a dome to which is connected a main line 8 which leads to the intake of the dry vacuum pump 20. This intake connection being at the far side of the vacuum pump, is not visible in the drawing. The outlet of pump 20 is diagrammatically shown at 21. A pipe 9 extends downwardly at about 45° from the header 6, and conducts condensate to a centrifugal condensate discharge pump 10, which discharges the water through a check valve 11 to a pipe 12 leading to a sewer 13. The discharge line has the usual pressure gauge 14, a thermometer connection 15, and a small vent pipe 16. Another vacuum line 17 serves to vent the condensate pump through a pipe 18 connected with pump 10 behind line 9 in the drawing, and the pipe 9 through a pipe 19. The pipe 17 passes up through the second floor 2 and connects to the line 8 to provide a head, so that condensate will not flow from the water pump to the vacuum pump.

2

In the installation illustrated, the pipe 3 is ten inches in diameter, while the laterally extending flume-like conduit is twelve inches in diameter and about five and one-half feet long, with a pitch of two inches in that distance. The arrangement is such that the conduit 4 is not flooded, and as the water flows through the conduit there is ample room for the air or non-condensable gas to bubble up through the water surface and flow into the top of the header without entrained droplets. At the same time, the condensate flows into the lower portion of the header and is removed by the centrifugal condensate pump.

The foregoing detailed description is given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, for some modifications will be obvious to those skilled in the art.

I claim:

1. In a condensate separator of the type adapted for use with a condenser in milk condensing plants, a condensate discharge pump, a dry vacuum pump, and a gas and water separating piping unit making sealed connection between the condenser and said pumps, said piping unit including an upright header whose upper portion is connected to said dry vacuum pump and whose lower portion forms a liquid receiver connected to said condensate pump, and a laterally extending flume-like conduit connecting the condenser and said header and providing a passage only partially filled with liquid during normal operation of the device so that gas may readily escape from the condensate flowing through the conduit to the header.

2. A condensate separator, comprising, a condensate discharge pump, a dry vacuum pump, and a gas and water separating piping unit including an upright header whose upper portion

is connected to said dry vacuum pump and whose lower portion forms a liquid receiver connected to said condensate discharge pump, and a laterally extending tubular flume-like conduit connected with said header and adapted to receive commingled condensate and gas, the cross-sectional area of said conduit being greater than the cross-sectional area of the stream of condensate flowing through the conduit so that gas may readily escape from the condensate during its passage through the conduit.

3. A condensate separator as claimed in claim 2, in which a short pipe connects the flume-like conduit with a supply of commingled condensate and gas, and said conduit is cylindrical, of larger diameter than said short pipe, and is pitched slightly downwardly toward the header.

4. A condensate separator as claimed in claim 3, including a passage interconnecting the header and the condensate discharge pump, a vacuum pipe connected at one end to the condensate discharge pump and to said passage and connected

at the other end to said connection between the upper portion of the header and the dry vacuum pump.

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