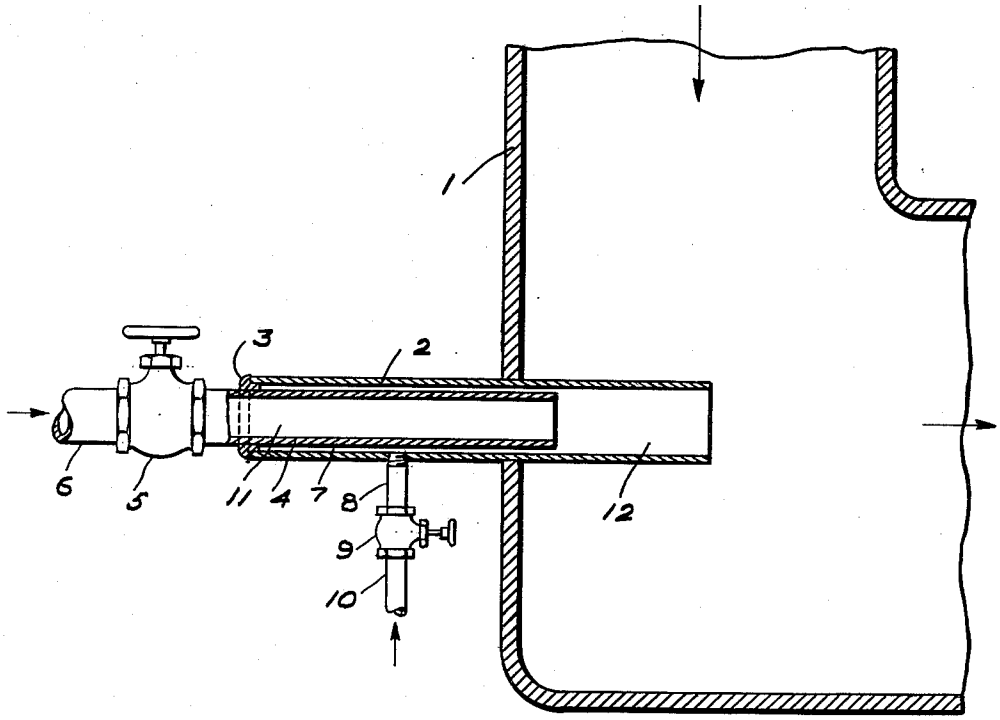
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METHOD FOR DISPERSING HIGH-BOILING LIQUIDS IN GASES

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METHOD FOR DISPERSING HIGH-BOILING LIQUIDS IN GASES

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2 Claims. (Cl. 23—2)

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This invention relates to a method for dispersing high boiling liquids in gases and more particularly to a method for vaporizing and dispersing sulfuric acid in a stream of roaster gases flowing to an electrical precipitator for the purpose of conditioning the gases to improve collection of the suspended sinter.

An object of the invention is to provide a process of this type for effectively and efficiently flash-vaporizing high boiling liquids by means of superheated steam under relatively high pressure.

Another object is to provide a process for the introduction and substantially instantaneous uniform incorporation of a high boiling liquid in a gas stream.

Another object is to provide a process for conditioning roaster gases, particularly gases from flash roasters handling zinc sulfide ores, with sulfuric acid prior to an electrical precipitation operation to improve collection efficiency with respect to the roasted ore.

These and other objects and advantages of the invention, as may appear hereinafter, are achieved in a process for introducing high boiling liquids into a body of gas which includes passing high pressure steam through a passage into a mixing passage of larger cross-sectional area than said first passage, introducing high boiling liquid into the mixing passage through a passage surrounding said first passage, and passing the mixture from the mixing passage into the body of gas. Preferably the high pressure steam employed has a pressure of at least 100 p. s. i. and not more than 500 p. s. i.; also the high pressure steam may advantageously be superheated to some extent, for example, from 25° F. to 150° F. of superheat may be employed.

The invention will be described with greater particularity with reference to the accompanying drawing in which the single figure is a sectional view of one form of apparatus for practicing the principles of the invention.

In the drawing, the apparatus shown includes an elbow portion of a gas flue 1, through which a stream of gas to be treated flows in the direction of the arrows.

An aspirator has an outer tube 2 projecting through a wall of the flue and aligned with the lower portion of the flue in such manner that vaporized high boiling liquid mixture issuing from the aspirator flows generally concurrently with the gas stream.

At the rear of the outer tube 2 is an annular ring 3 welded to the tube and through which extends an inner tube 4, the latter also being

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welded to the ring 3. Both tube joints at the ring 3 are pressure-tight.

A valve 5 is fitted to the rearward end of the tube 4 and controls admission of steam from the line 6 to the apparatus.

Into the annular space 7 between the inner tube 4 and the outer tube 2, a nipple 8, that is tapped into the wall of tube 4, conducts sulfuric acid or other high boiling liquid to be dispersed. The flow of high boiling liquid is under control of a valve 9 to which pipe 10 conducts the liquid from a reservoir (not shown).

It has been found that best operation of the aspirator is obtained when the inside diameter of the outer tube 2 does not exceed 1.1 times the outside diameter of the inner tube 4. Where the inner tube is fabricated from 1" pipe stock, the annular space has a radial dimension of not greater than $\frac{1}{16}$". In this case, the ratio of the cross-sectional area of the annular space 7 to the cross-sectional area of the passage within tube 4 is approximately 0.6.

Although the length of the outer tube 2 is not critical, its length typically is from 7 to 10 times its inside diameter. Also, in practice, the distance from the mouth of tube 2 to the mouth of tube 4 may be about ⅓ the length of tube 2, and the distance from the mouth of tube 4 to the liquid inlet nipple 8 may be about the same.

For most practical purposes, the steam tube 4 ranges from ¼" inside diameter to 3" inside diameter.

It will be seen that the aspirator provides three principal passages: (*a*) the annular passage 7, (*b*) a steam passage 11, and (*c*) a mixing passage 12.

In operation, the valve 5 is opened and high pressure superheated steam rushes through the passage 11, through the mixing chamber 12, and into the gas flue 1, in which it expands greatly to produce violent turbulence and agitation. When the valve 9 is opened, an annular stream of high boiling liquid is established in the space 7. Because of the pressure differential existing between the liquid inlet and the opening of the annular space into the mixing chamber 12, an annular stream of high boiling liquid is forced into the mixing chamber. The high pressure steam is thus effectively introduced into the lumen of the annular stream of high boiling liquid.

In the mixing chamber 12, the high boiling liquid is vaporized and dispersed in the steam, and the mixture thereby produced is expanded into the gas stream in the flue 1.

Mixing of the high boiling liquid with the gas stream in very disperse and/or vaporized form is thus quickly and uniformly accomplished.

The invention finds particular and advantageous application in the conditioning of gases from a zinc sulfide ore flash-roasting process prior to removing the suspended material from the gas stream by electrical precipitation. For example, gases from the flash roaster are passed through the flue 1 in the direction of the arrows to an electrical precipitator (not shown). The aspirator, having a 1'' steam tube 4, is supplied with steam at 140 pounds per square inch pressure and having 50° F. of superheat. Under these conditions, up to 4 tons per day of 75% aqueous H_2SO_4 is dispersed into the gas stream without any drip occurring from the aspirator. The reaction between the sulfuric acid and the roasted ore particles in the gas stream is rapid and thorough.

The liquid sulfuric acid, which is extremely hazardous, is effectively dispersed without being placed under super-atmospheric pressure. In fact, the pressure of the sulfuric acid in the liquid supply conduits may be less than atmospheric pressure at some points.

I claim:

1. Method of conditioning for electrical precipitation gases from the flash roasting of sulfide ores which comprises establishing an annular stream of sulfuric acid, introducing a stream of fluid consisting substantially only of superheated steam at a pressure of at least 100 pounds per square inch into the lumen of said annular stream, and passing the mixture thereby produced into the stream of gases from the roasting operation.

2. Method of conditioning for electrical precipitation gases from the flash roasting of sulfide ores which comprises establishing an annular stream of sulfuric acid, introducing a stream of fluid consisting substantially only of superheated steam into the lumen of said stream, and passing the mixture thereby produced into a stream of gases from a sulfide ore roasting operation.

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