

June 15, 1943.

R. VALDEZ

2,321,879

GASEOUS DIFFUSER

Filed April 17, 1942

2 Sheets-Sheet 1

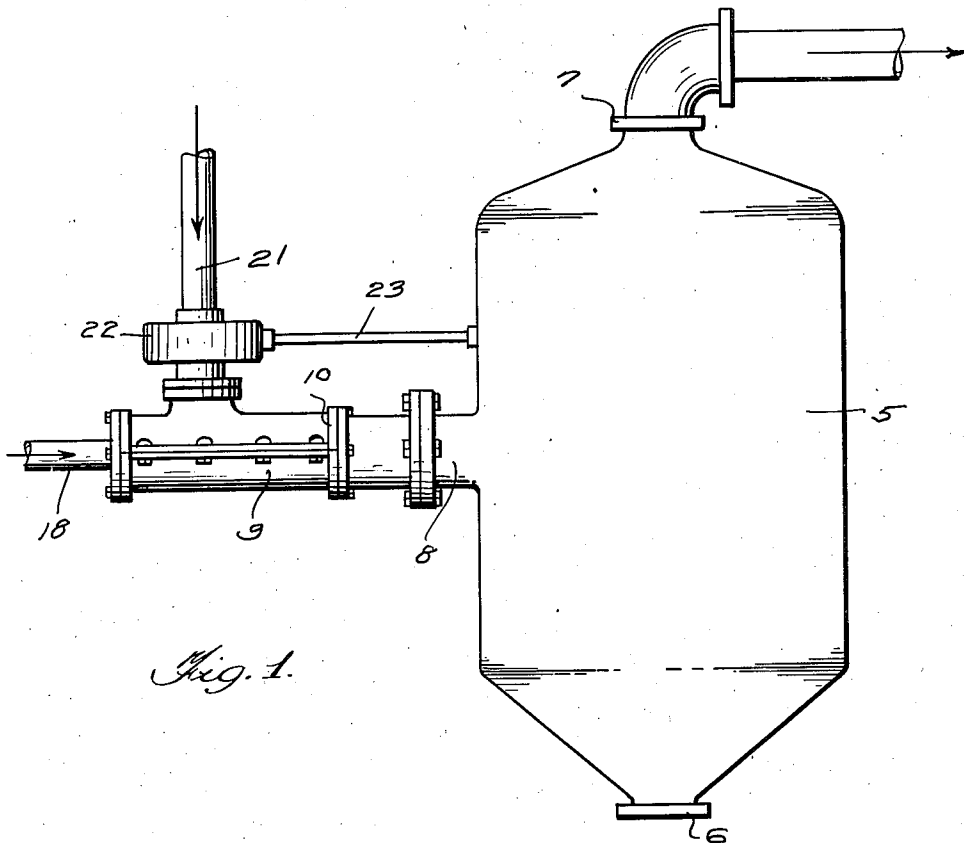


Fig. 1.

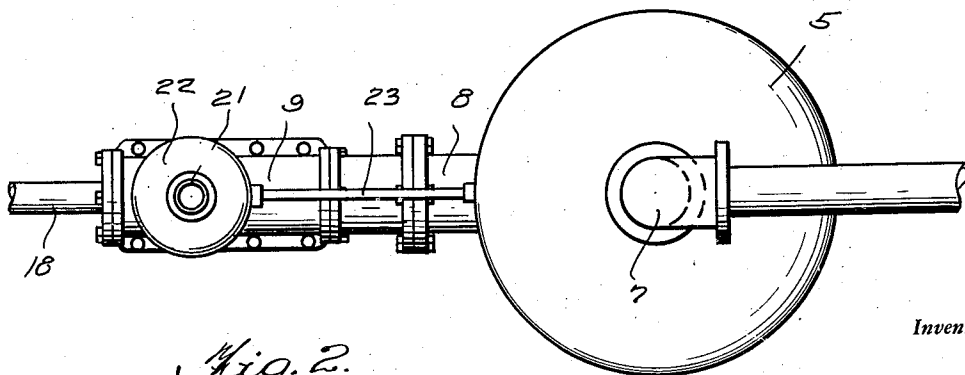


Fig. 2.

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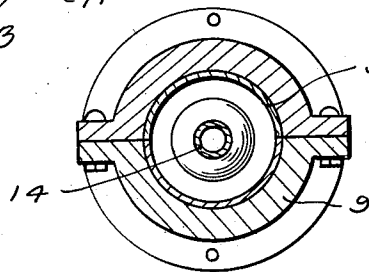
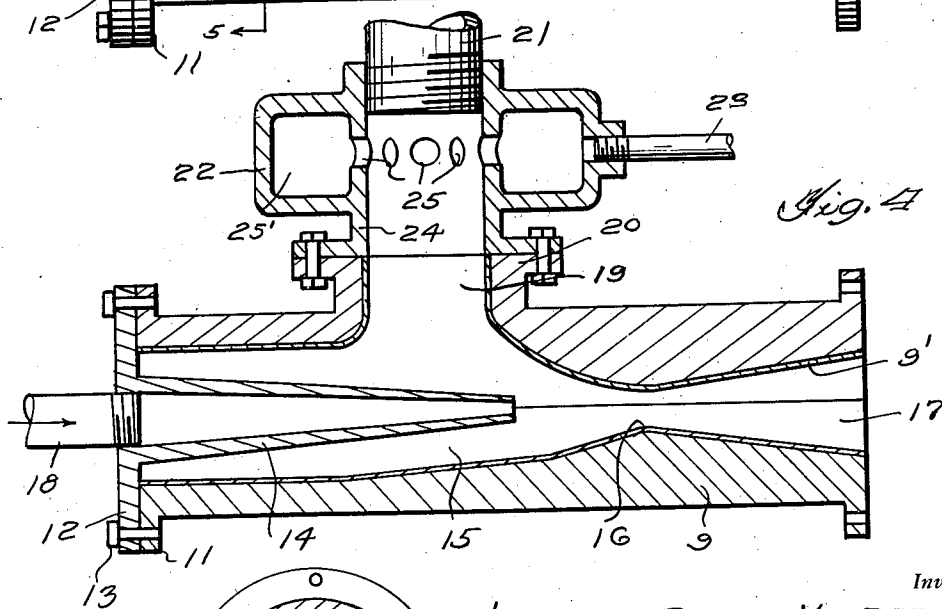
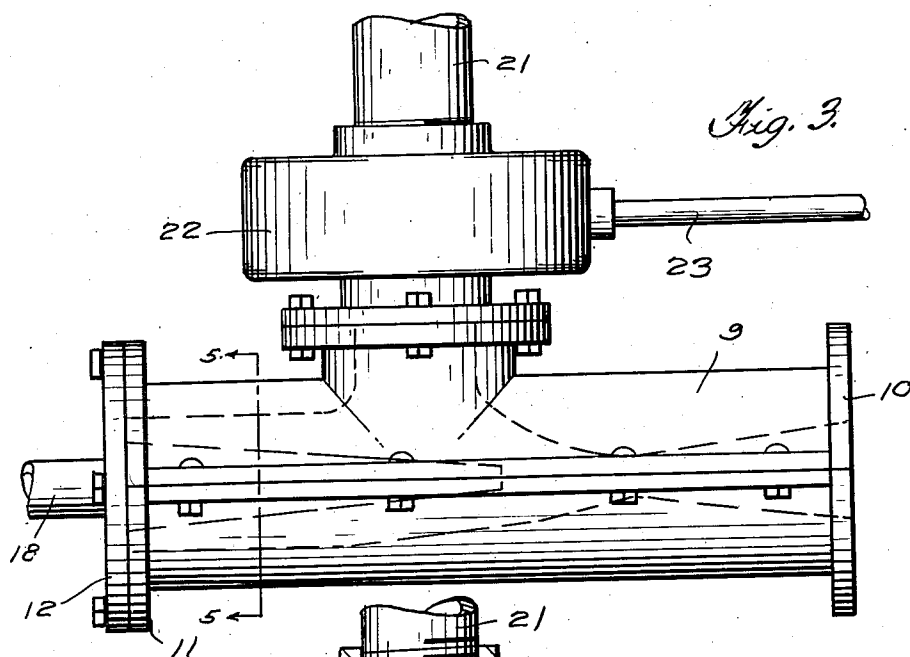
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2 Sheets-Sheet 2



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Fig. 5.

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UNITED STATES PATENT OFFICE

2,321,879

GASEOUS DIFFUSER

Rafael Valdez, New York, N. Y.

Application April 17, 1942, Serial No. 439,431

2 Claims. (Cl. 261—76)

The present invention relates to new and useful improvements in device for diffusing gases in liquids, and more particularly to the construction of a steam injector, which serves to diffuse the gases into the liquid in question. The invention is designed primarily for use in treating sugar cane juices with sulphur dioxide in a continuous operation.

An important object of the invention is to provide a steam injector accessible for easily repairing the same, and suitable for lining with acid resisting metals.

Another object is to provide recirculation means for part of the treated liquid.

A further object of the present invention is to provide a steam injector of a simple and practical construction which is efficient and reliable in performance, relatively inexpensive to manufacture, and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the details of construction, as more fully herein described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevational view of the reaction chamber and steam injector forming the subject matter of the present invention.

Figure 2 is a top plan view thereof.

Figure 3 is a side elevational view of the steam injector and recirculation manifold.

Figure 4 is a longitudinal sectional view thereof, and

Figure 5 is a transverse sectional view taken substantially on a line 5—5 of Figure 3.

Referring now to the drawings in detail, wherein for the purpose of illustration I have disclosed a preferred embodiment of the invention, in reference to Figure 1, the numeral 5 designates the reaction chamber, through which the cane juice flows continuously, entering at the bottom of the chamber having an inlet connection 6, and leaving at the top of the chamber, having an outlet connection 7.

A pipe connection 8 is formed at one side of the chamber 5, to which a steam injector 9 is connected, the steam injector being shown in detail in Figures 3 to 5 inclusive.

The steam injector is constructed of longitudinally split cylindrical sections, detachably connected along the split edges, and is provided with an attaching flange 10 at one end secured to the pipe connection 8, and an attaching flange 11 at its opposite end, to the latter of which is secured

an end plate 12 by means of bolts 13. A tapering nozzle 14 is formed on the inner wall of the plate 12, and projects into the bore 15 of the steam injector. As shown to advantage in Figure 4 of the drawings, the bore 15 is constricted, as shown at 16, at a point immediately beyond the discharge end of the nozzle 14, and from the constricted portion 16 the bore is flared as shown at 17, in a direction toward the chamber 5. The two cylindrical split sections of the steam injector may be provided with an acid resisting lining 9', according to the reactivity of the gases to be handled. The nozzle 14 may also be lined with similar material.

At the junction of the nozzle 14 with the plate 12, the nozzle is internally threaded for threaded engagement with the steam pipe 18.

A lateral port 19 is provided in the steam injector, slightly behind the discharge end of the nozzle 14, with a flange 20 for attaching to a feed pipe 21 by means of which sulphur dioxide gas is suctioned into the steam injector, and forced into the reaction chamber in a stream-mixture of sulphur dioxide and steam. This mixture of steam and sulphur dioxide is incorporated with the cane sugar juice flowing continuously through the reaction chamber.

A recirculation system is provided for a part of the treated liquid and comprises a shell 22 interposed between the port 19 and feed pipe 21, the shell having a pipe 23 leading thereto from the chamber 5 at a point above the connection 8. A pipe 24 is formed in the shell providing a direct connection between the feed pipe 21 and port 19 for the sulphur dioxide gas entering the steam injector 9 and the walls of the pipe 24 are provided with opening 25 and spaced from the walls of the shell 22 to form a chamber 25' in the shell so that the treated liquid entering the shell from the reaction chamber 5 will enter the pipe 24 at several points to be thoroughly mixed with the gas before reaching the steam injector.

While I have described the operation and construction of this apparatus as applied in the treatment of sugar cane juices with sulphur dioxide gas, it will be apparent that the invention may be used wherever desired for saturating liquids with gases.

It is believed the details of construction, advantages and manner of use of the invention will be readily understood from the foregoing without further detailed explanation.

Having thus described the invention what I claim is:

1. A mixing apparatus of the class described

comprising a reaction chamber in a liquid feed line, a tubular body having one end connected to the chamber, a nozzle projecting into the other end of the body adapted to feed steam under pressure thereto, a lateral feed port in one side of the body behind the inner end of the nozzle, the suction force of steam entering the body being adapted to draw fluid into the body through the lateral port for mixing with the steam, a fluid feed pipe connected to the lateral port, a chamber surrounding the last-named pipe, said last named pipe having perforations communicating with the last-named chamber, and a recirculation pipe connecting the first and second chambers.

2. A mixing apparatus of the class described comprising a reaction chamber in a liquid feed line, a tubular body having one end connected to

the chamber, a nozzle projecting into the other end of the body adapted to feed steam under pressure thereto, a lateral feed port in one side of the body behind the inner end of the nozzle, the suction force of steam entering the body being adapted to draw fluid into the body through the lateral port for mixing with the steam, a fluid feed pipe, a connector between the lateral port and the fluid feed pipe and including a central passage in the connector and an annular passage surrounding the central passage and communicating at spaced circumferential points with the central passage, and a recirculation pipe leading from the reaction chamber to the annular passage of the connector.

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