# United States Patent

**Straitz, III**

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[54] **VENT SEALS**


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[52] **U.S. Cl.** .....**137/171,** 138/42, 55/444

[51] **Int. Cl.**.....**B01d 45/02,** F15d 1/02

[58] **Field of Search** .....137/171, 203; 138/42, 43; 55/442, 443, 444, 441



[56] **References Cited**

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[57] **ABSTRACT**

A vent seal is provided which includes an outer cylindrical housing having an inlet and an outlet pipe, a plurality of inner baffle plates within the housing forming a seal, and an optional upper outlet baffle in the outlet pipe.


**7 Claims, 3 Drawing Figures**

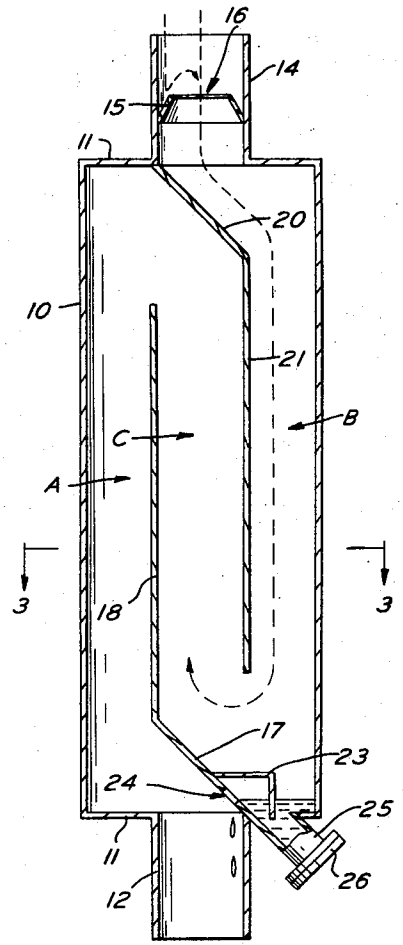


FIG. 1

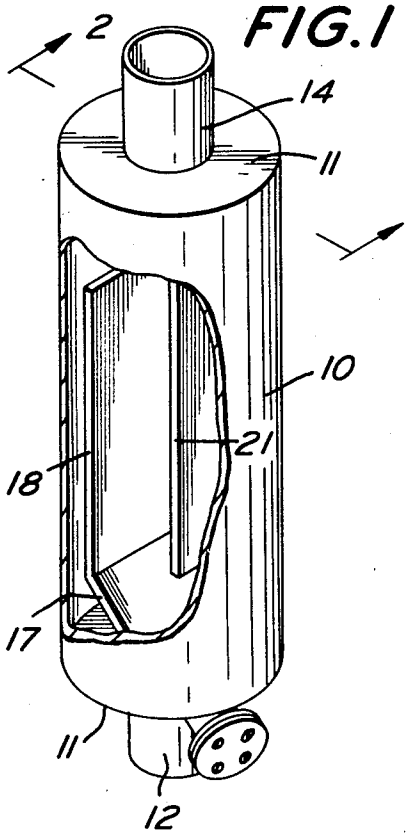



FIG. 2

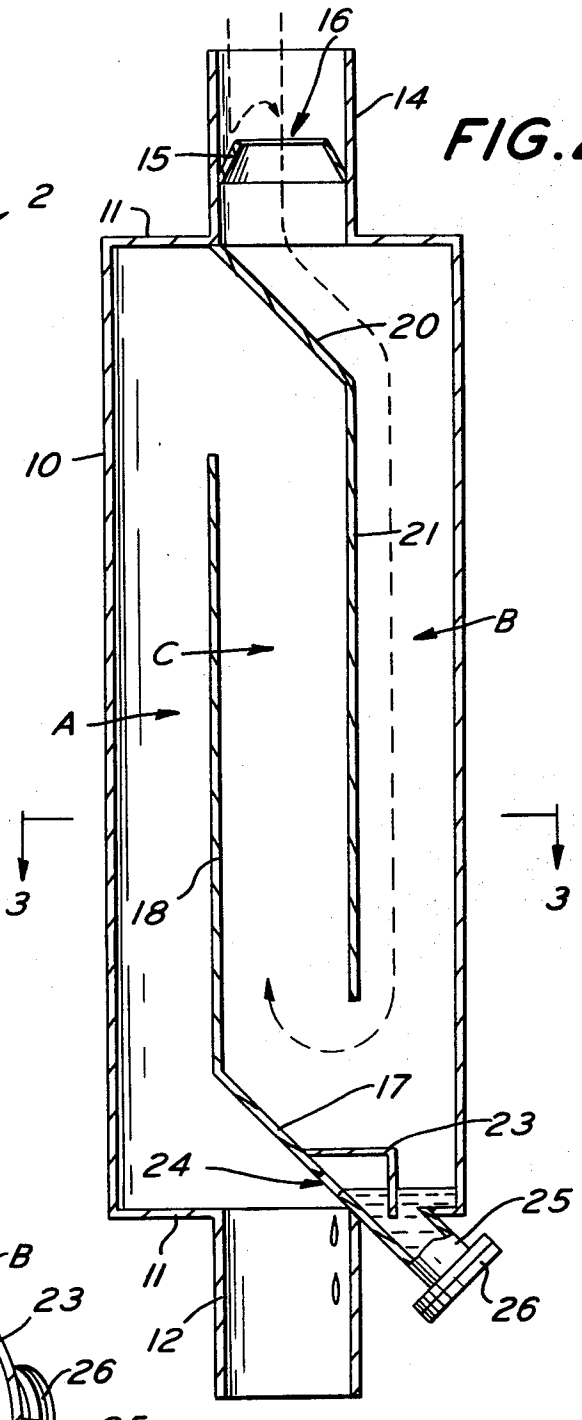
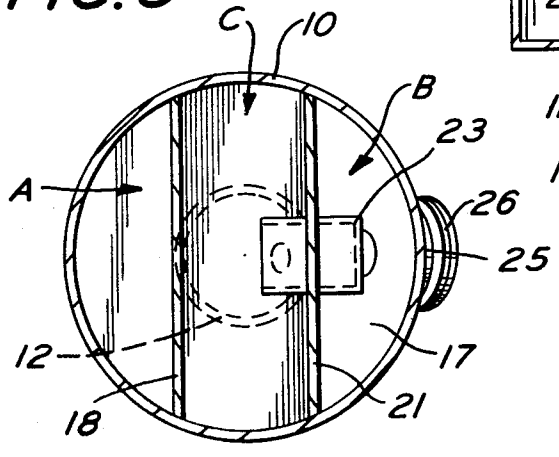



FIG. 3




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# VENT SEALS

## BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to vent seals and more particularly to such seals for preventing the return flow of gas or air in a stack.

2. Description of the Prior Art

The possibility of an explosion occurring in a stack through which potentially combustible or unburned gasses are being conducted is a real hazard and can occur if there is a stoppage of flow or if air moves down the stack during flow or if there is a reversal of flow. This hazard is present in refineries and other process plants. The reversal of flow may be due to wind and wind variation.

Various efforts have been made to solve the problem, none of which has proven wholly satisfactory.

It has been proposed to purge or counteract the effect of the entry of air into the stack when it is shut down by establishing a flow of oxygen-free gas through the stack. A sufficiently large flow for purging must be established to compensate for wind effect and the supplying of such gas is costly. The wind effect is thought to result from the wind on the exterior of the stack producing a high pressure zone upstream of the end of the stack and a low pressure zone downstream, resulting in a circulation of air down the stack.

It has been proposed to employ flame arrestors with a large surface area to chill and quench the flame. Such arrestors are bulky, difficult to support at the elevated locations, require and may impose an excessive back pressure on the system.

Mechanical seals with counterbalanced valve plates have also been proposed, but these have shortcomings under the adverse operating conditions to which they are subjected.

Labyrinth-molecular seals have also been proposed but the constructions heretofore proposed are not as effective as desired for the weight of the material. One typical device of this nature is shown in the U.S. Pat. to Reed, No. 3,055,417. If a labyrinth with many passes is provided such as shown in French Pat. No. 374,060 to Wagmann-Hauser, FIGS. **4** and **5**, the back pressure may be excessive and prevent the necessary flow.

The apparatus of the invention uses a gravimetric seal within the stack to resist the downward air circulation and may optionally use a baffle at the outlet of the stack for additional sealing.

## SUMMARY OF THE INVENTION

In accordance with the invention, a vent seal is provided which includes an outer housing and a plurality of inner baffle plates which form a gravimetric seal that imposes severe restrictions on flow reversal without imposing undue outward outlet flow restrictions, with an optional outlet baffle.

It is the principal object of the invention to provide a vent seal which is simple in construction and effective in operation.

It is a further object of the invention to provide a vent seal which will permit the draining off of corrosive fluid accumulated therein.

Other objects and advantageous features of the invention will be apparent from the description and claims.



## BRIEF DESCRIPTION OF THE DRAWINGS

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part thereof, in which:

FIG. **1** is a view in perspective and partly broken away to show the interior construction of the vent seal in accordance with the invention;

FIG. **2** is a vertical sectional view, enlarged, taken approximately on the line **2—2** of FIG. **1**; and

FIG. **3** is a horizontal sectional view, taken approximately on the line **3—3** of FIG. **2**.

It should, of course, be understood that the description and drawings herein are illustrative merely and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings, the vent seal of the invention as shown in FIGS. **1** to **3** includes an outer hollow cylindrical housing **10** closed at the ends by plates **11** with an inlet pipe **12** connected thereto at the bottom end, and through which passes gas for burning or purging. The housing **10** at its upper end has an outlet pipe **14** connected therewith communicating with the interior of housing **10**. The pipe **14** is shown with an optional circular convex baffle plate **15** therein with an optional central opening **16** of lesser diameter than the outlet pipe **14**. The plate **15** is not necessary to the efficient operation of the apparatus but provides desirable additional sealing.

The housing **10**, in the interior thereof, has an upwardly inclined inlet baffle plate **17** adjacent the inlet pipe **12** which extends in axial alignment with the wall of pipe **12**. A plate **18** is connected to the plate **17** and extends vertically upwardly towards the top of housing **10** but is terminated in spaced relation therebelow. The plates **17** and **18** both extend across the housing **10** as seen in FIG. **3** to define an upward flow passageway A within the housing.

Adjacent the outlet pipe **14**, a downwardly inclined outlet baffle plate **20** is provided which begins at one edge of pipe **14** and extends across to end in alignment with pipe **14** at the other side. A plate **21** is attached to the plate **20** and extends in parallel relation to the plate **18** forming an upward passageway B within the outer housing and a downward passageway C between baffle plates **17** and **18**.

The bottom inlet baffle plate **17** has a liquid collection plate **23** attached thereto of L-shaped configuration and extending over an opening **24** in the plate **17**. The housing adjacent the plate **23** has a drain pipe **25** with cap **26** thereon for removal of corrosive liquid that collects on plate **17**, and which does not flow into pipe **12** through opening **24** for outward flow.

In operation, the gas to be burned or the purging gas flows under pressure from a source (not shown) to the inlet pipe **12** and into the upward flow passageway A. The gas will then turn the relatively sharp corner around the end of plate **18** and into the downward flow passageway C where it flows down and around the rela-

tively sharp corner at the end of plate **21** and into the upward flow passageway B. The gas then flows out the outlet pipe **14** for burning or for purging. The upward and downward flow passageways with the sharp turns therebetween resist any change of flow or any flow of air downwardly in passageway B. Even though a small quantity of air may move down the pipe **14** along the wall and along the plates **20** and **21**, the air will not be able to turn the corner into C and will be raised up and out by the flow in passageway B. The corrosive material carried in the gas stream will settle out in passageway B and collect on plate **17** where it can be removed through drain pipe **25** or it will flow into pipe **12** through opening **23** and is carried out with the gas.

The horizontal disposition of the upper end closure **11** causes a portion of the upwardly moving gas to be directed horizontally toward the baffle plate **20** which also inhibits down flow of air at that location.

If desired, the baffle plate **15** may be employed to provide a further obstacle to prevent downward gas flow into pipe **14**, since its smaller diameter opening **16** will increase the velocity of gas exiting pipe **14** and its shape tends to reduce the likelihood of any air flowing downward past it through pipe **14** and into passageway B.

I claim:

**1.** A vent seal which comprises

an outer vertical cylindrical housing having upper and lower end closures,

an inlet pipe connected to the lower end closure and communicating with the interior of the housing,

an outlet pipe connected to the upper end closure and communicating with the interior of the housing, and

means in said housing providing a gravimetric seal resistant to flow reversal within said housing,

said means including

an inclined inlet baffle plate extending inwardly from said lower end closure and from one side of said inlet pipe, and across said housing and being connected thereto,

a first vertical baffle plate extending upwardly from said inlet baffle plate and terminating in spaced relation to said upper end closure and extending across said housing and being connected thereto,

said inlet baffle plate, first baffle plate and said housing providing an upward flow passageway connected to said inlet pipe,

an inclined outlet baffle plate extending downwardly from said upper end closure and from one side of said outlet pipe and across said housing and being connected thereto, and

a second vertical baffle plate extending downwardly from said outlet baffle plate in spaced relation to said first baffle plate and terminating in spaced relation to the lower end closure and extending across said housing and being connected thereto,

said first and second baffle plates providing a downward flow passageway with sharp turns at its entrance and exit,

said outlet baffle plate, second vertical baffle plate and said housing providing an upward flow passageway connected to said outlet pipe.

**2.** A vent seal as defined in claim **1** in which

said upper end closure and said baffle are disposed to direct a portion of the gas flow transversely with respect to said outlet pipe.

**3.** A vent seal as defined in claim **1** in which

an additional seal baffle plate is provided in said outlet pipe.

**4.** A vent seal as defined in claim **3** in which

said additional seal baffle plate is frusto-conical with a central opening and is converging upwardly.

**5.** A vent seal as defined in claim **1** in which

said housing at the lower portion thereof and below said second vertical baffle plate is provided with a liquid collecting space.

**6.** A vent seal as defined in claim **5** in which

a discharge pipe is provided connected to said space.

**7.** A vent seal as defined in claim **5** in which

said inlet baffle plate has a liquid collector plate carried thereby for delivery of liquid into said space.

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