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W. VAN GUILDER
FUME EXHAUST MANIFOLD
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Fig. 1

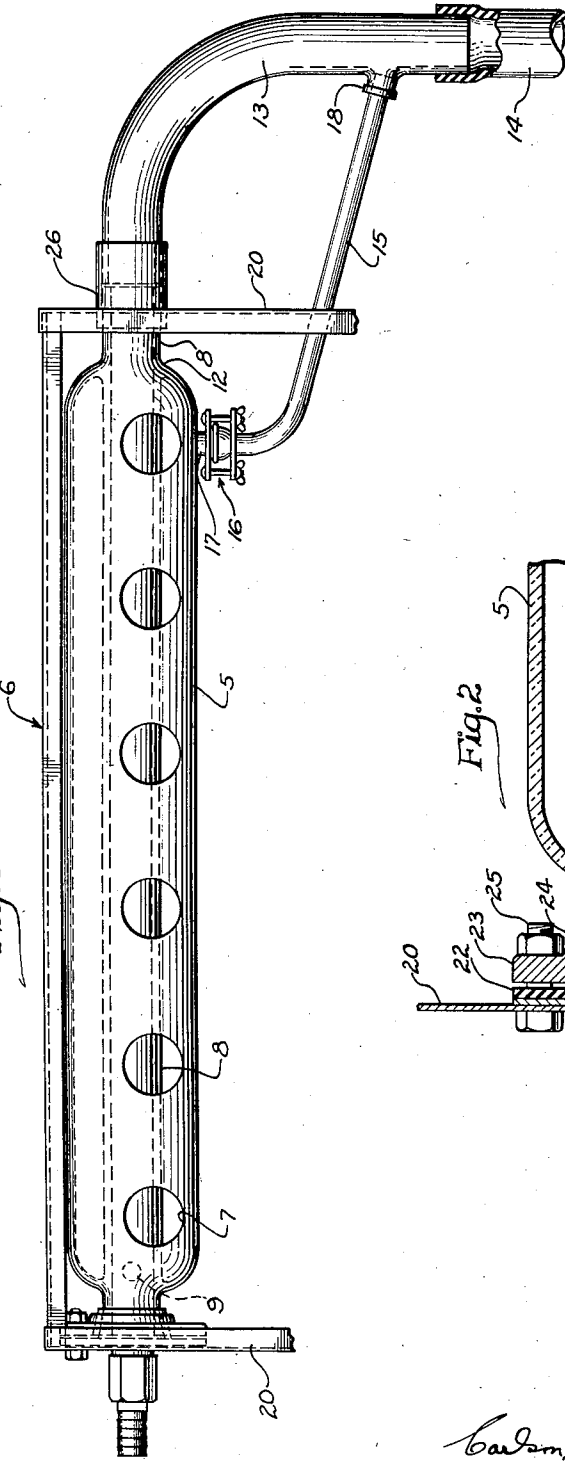
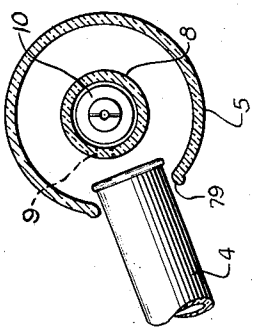
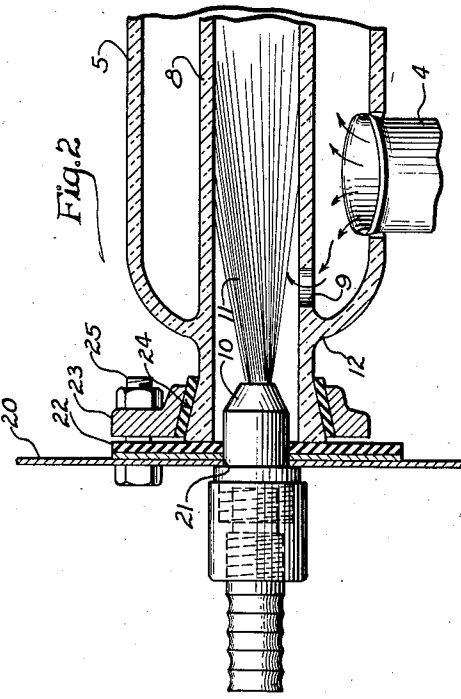


Fig. 2



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FUME EXHAUST MANIFOLD

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5 Claims. (Cl. 230—95)

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The invention relates to apparatus for carrying out chemical processes, such as Kjeldahl digestions in which noxious fumes are generated, and it is concerned particularly with an improved fume exhaust manifold for collecting and disposing of such fumes.

One object of the invention is to provide a fume exhaust manifold of the above general character adapted to collect and condense the fumes in an efficient and expeditious manner which materially increases the capacity of the manifold and which effectually prevents the escape of objectionable fumes.

Another object is to provide an exhaust manifold for collecting the fumes generated in chemical processes carried out in relatively small vessels such as Kjeldahl flasks, in which a substantial portion of the collected fumes is quickly condensed to liquid form and in which the uncondensed fumes are effectually withdrawn from the vessels and mixed with a solvent such as water.

A further object is to provide a fume exhaust manifold having built-in aspirating means for fume withdrawal constructed and arranged so that the fluid medium utilized for operating the aspirating means additionally serves as a cooling agent for condensing a portion of the fumes.

Other objects and advantages of the invention will become apparent from the following detailed description of the preferred embodiment illustrated in the accompanying drawing, in which:

Figure 1 is a side elevational view of a fume exhaust manifold of a type particularly suitable for Kjeldahl digestions and embodying the features of the invention.

Fig. 2 is a fragmentary longitudinal sectional view of the manifold.

Fig. 3 is a transverse sectional view of the manifold showing the manner in which it is associated with a digesting vessel.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

For purposes of illustration, the improved fume exhaust manifold has been shown in a form particularly suitable for use in laboratory apparatus in which digestion or other chemical processes are carried out in vessels of glass or similar

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material, as, for example, Kjeldahl flasks. Such vessels are formed with elongated necks 4 through which the vessels may be filled and from which the fumes generated in the process are discharged.

Referring to the drawing, the improved fume exhaust manifold in its preferred form comprises an elongated hood 5, herein shown as tubular in form, adapted to be supported in a substantially horizontal position in a frame 6 and having one or more openings 7 in its peripheral wall for communication with the vessel or vessels from which fumes are to be collected. When the apparatus is assembled, the hood 5 is positioned so that the openings face laterally thus providing a channel within the hood for the accommodation of condensate forming therein.

In the particular manifold illustrated, openings 7 are provided for six vessels, such as Kjeldahl flasks, the openings being spaced apart longitudinally of the hood 5 to conform to the spacing of the flasks in a conventional Kjeldahl rack, of which the frame 6 forms a part. The openings in this instance are dimensioned to receive the necks 4 of the flasks so that the fumes generated in the flasks are discharged directly into the hood 5.

To dispose of the fumes collected in the hood 5, the manifold is provided with aspirating means such as a jet pump for exhausting the fumes from the member. In accordance with the invention, the aspirating means is constructed and related to the hood 5 in a novel manner whereby the fluid medium for operating the aspirating means is utilized additionally as a cooling agent for condensing a portion of the collected fumes. The fume disposal capacity of the manifold is thus materially increased and leakage of fumes therefrom is effectually prevented.

To obtain the dual aspirating and condensing effect, the aspirating means is formed with an elongated tubular body 8 open at both ends and communicating with the interior of the hood, in this instance through a port 9. A nozzle 10 mounted within one end of the body 8 is positioned to direct a jet 11 of fluid longitudinally of the body across the port 9 to create a suction through the port. In the exemplary manifold, the body 8 of the aspirating means is substantially smaller in cross sectional area than the hood 5 and is disposed coaxially therein. Preferably, both the hood 5 and the body 8 are constructed of the same material, such as lead, glass, or other corrosion resistant material and the ends of the hood are turned in and sealed to the walls of the

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body as at 12. The arrangement is such that the port 9 is located within the hood and fumes collected in the hood are accordingly sucked into the port by the action of the jet 11.

The fluid introduced through the nozzle 10 after performing its suction-producing action flows through the body 8 of the aspirating means and is discharged at the end remote from the nozzle. The spent fluid is carried away for disposal by a drain conduit, herein shown as comprising an elbow fitting 13 connecting the end of the body 8 with a drain pipe 14. In its passage through the body 8, the fluid, which is usually cold water, performs the additional function of cooling the wall of the body to a temperature effective to condense a portion of the fumes collected in the hood 5.

As the body 8 extends the full length of the hood 5, it presents a relatively large condensing surface therein for condensing a substantial portion of the fumes collected in the hood. The quantity of uncondensed fumes left for removal by the aspirating means is correspondingly reduced and the over-all fume disposal capacity of the manifold and its operating efficiency are therefore greatly increased.

For removing the condensate collecting in the hood 5, the drain conduit is provided with a branch communicating with the hood. This branch, as herein shown, is in the form of a bent tube 15 having at one end a clamped ball joint connection 16 with an entry tube 17 in the wall of the hood and having its other end seated within a flanged opening 18 in the wall of the fitting 13. As will be seen by reference to Fig. 1 of the drawing, the tube 15 is shaped so that the condensate may flow freely from the hood 5 into the drain conduit in which it is mixed with and dissolved in the liquid drained from the aspirating means.

In the exemplary embodiment illustrated, the body 8 of the aspirating means is extended substantially beyond the ends of the hood 5 and serves to support the manifold structure on uprights 20 forming a part of the frame 6. As shown in Fig. 2, the jet end of the body is clamped against the upright 20 in registration with an opening 21 formed therein for the reception of the nozzle 10. A gasket 22 of suitable resilient material is interposed between the end of the body and the upright. Clamping is effected in this instance by a collar 23 having a conical socket for cooperation with the end of the body which is tapered as indicated at 24. The collar 23 is removably secured to the upright 20 as by bolts 25. At the other end of the manifold, the projecting end of the body 8 extends through an opening in the adjacent upright 20, which is preferably dimensioned for the accommodation of a coupling member 26 for connecting the body with the fitting 13.

It will be apparent from the foregoing that the invention provides a fume exhaust manifold of novel and advantageous construction. The manifold includes a tubular hood for collecting fumes generated in processing vessels, together with built-in aspirating means which serves the dual purpose of condensing a portion of the collected fumes and exhausting the uncondensed fumes from the hood. Efficient operation is insured by the novel construction and relationship of the parts whereby the fluid utilized for operating the aspirating means is additionally used as a cooling medium for fume condensation. In general, the improved manifold is simple in con-

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struction, efficient in operation, and its capacity is substantially greater than manifolds of similar size as heretofore constructed.

I claim as my invention:

1. A fume exhaust manifold for collecting fumes generated by chemical processes carried out in necked vessels comprising, in combination, an elongated tubular hood closed at opposite ends and having a series of longitudinally spaced openings for receiving the necks of the vessels, a tubular element of smaller cross sectional area than said hood extending longitudinally through the hood, said element communicating with the interior of said hood adjacent one end thereof, a nozzle arranged to direct a jet of fluid into said element at said one end thereof to create a suction effective to draw fumes from the hood into the element, said fluid serving additionally to reduce the temperature of said element and thereby effect a condensation of a portion of the fumes collected in said hood, and a conduit connected with the hood for draining the condensate therefrom.

2. A fume exhaust manifold for collecting fumes generated by chemical processes carried out in necked vessels comprising, in combination, an elongated tubular hood closed at both ends and having a series of longitudinally spaced openings for receiving the necks of the vessels, a tubular element extending longitudinally through said hood and projecting at opposite ends thereof, said element having a laterally opening port adjacent one end communicating with the interior of said hood, a nozzle disposed in said one end of said element for directing a jet of fluid across said port axially of the element, a drain conduit connected to the other end of said element for receiving the fluid passing through the element, said fluid being effective to cool said element and thereby effect a condensation of a portion of the fumes collected in said hood, said jet being operative to create a suction for drawing the uncondensed fumes into said element through said port, and a branch conduit extending between said hood and said drain conduit for draining off the condensate from the hood.

3. A fume exhaust manifold for collecting fumes generated in necked vessels comprising, in combination, an elongated tubular hood closed at opposite ends and having a series of longitudinally spaced openings for receiving the necks of the vessels, means for aspirating the fumes from said hood including an elongated tubular element extending axially through said hood and communicating with the interior of the hood, a nozzle for directing a jet of liquid into said tubular element to create a suction effective to draw the fumes from said hood into the element, a drain conduit connected to the other end of said element for receiving the fluid passing through the element, said fluid serving to cool said element and thereby effect a partial condensation of the fumes collected in said hood, and a drain tube connecting said hood with said drain conduit for draining off the condensate from the hood.

4. Apparatus for collecting and disposing of the fumes generated in a necked vessel comprising, in combination, a tubular hood closed at opposite ends and having a lateral opening for receiving the neck of the vessel, a tubular element extending through and projecting at opposite ends of the hood, said element having a laterally opening port communicating with the interior

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of the hood, means for directing a jet of fluid into one end of said element and across said port to create a suction effect operative to draw fumes from the hood into said element, said fluid acting to cool said element and thereby effect a partial condensation of the fumes collected in the hood, and conduit means for draining the condensate from the hood.

5. Apparatus for collecting and disposing of the fumes generated in a necked vessel comprising, in combination, a tubular hood closed at opposite ends and having a lateral opening for receiving the neck of the vessel, a tubular element extending through and projecting at opposite ends of the hood, said element communicating with the interior of the hood adjacent one

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end thereof, means for directing a jet of fluid into said element to create a suction effect operative to draw fumes from the hood into the element, and a conduit connected to the other end of said element for draining the fluid from said element.

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