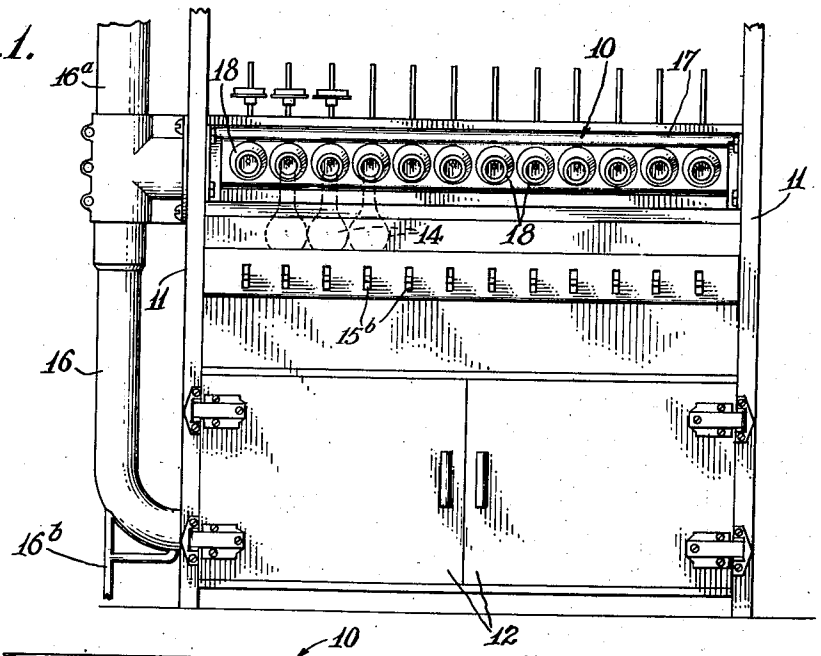
Aug. 6, 1940. A. I. NEWMAN 2,210,176

FUME TUBE

Filed July 13, 1939

Fig. 1.



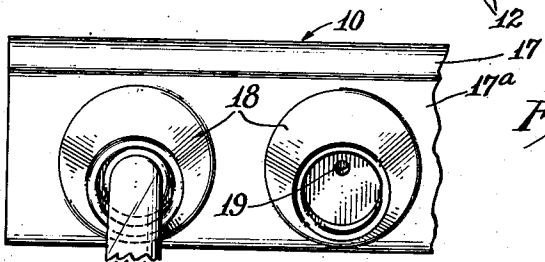


Fig. 3.

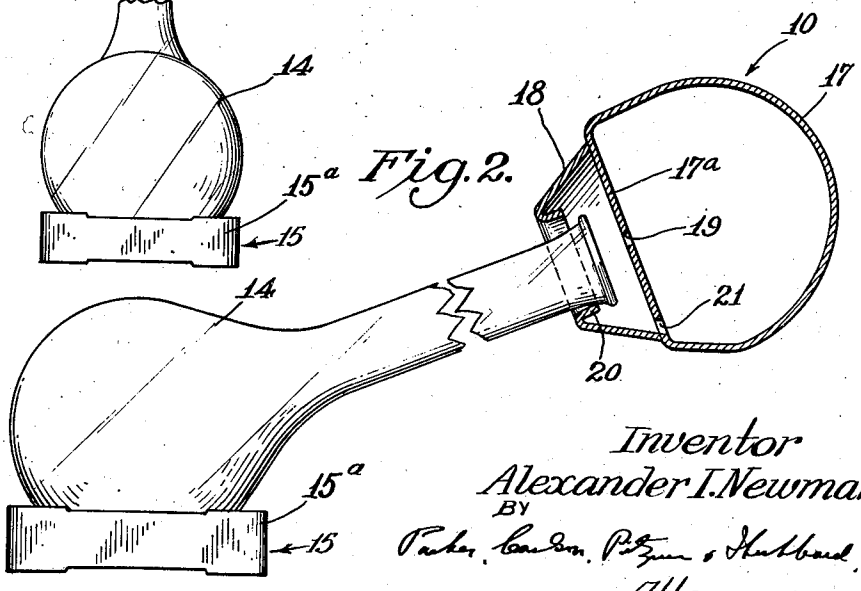


Fig. 2.

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FUME TUBE

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3 Claims. (Cl. 23—292)

The invention relates to digestion apparatus such as is employed, for example, in carrying out the well known Kjeldahl process, and more particularly to a new and improved fume tube construction for such apparatus.

The primary object of the invention is to provide in an apparatus of the type indicated an improved fume tube having one or more of the following advantageous characteristics: (*a*) facilitates easy attachment and detachment of digesting flasks, (*b*) does not require a nipple or other protrusion to be inserted into the flask mouth so that danger of contamination of the flask contents from such a source is obviated, (*c*) provides an intermediate chamber to receive sudden puffs of vapor emitted from the flask without disturbing the flow of gases in the main portion of the fume tube and yet affords a good draft from the flask into the fume tube during normal operation, (*d*) provides a smooth unobstructed channel in the main tube free of protrusions which would otherwise set up eddy currents, (*e*) effectually traps any condensate flowing from the flask mouth so as to prevent drip, and (*f*) constitutes a structure of extreme compactness or minimum over-all height.

Further objects and advantages of the invention will become apparent as the following description proceeds, taken in connection with the accompanying drawing in which:

Figure 1 is a front elevation of a digestion apparatus embodying the invention.

Fig. 2 is an enlarged transverse sectional view of the fume tube assembly together with an associated flask.

Fig. 3 is an enlarged fragmentary front elevation of a portion of the fume tube and an associated flask.

The invention has been illustrated herein as embodied in a fume tube assembly, designated generally by the numeral 10, for a particular form of digestion apparatus shown in Fig. 1. It will be apparent to those skilled in the art, however, that the digestion apparatus may take various other forms and that a variety of structural changes may be made in the fume tube assembly as the requirements of a particular installation dictate. Consequently, even though one particular embodiment and application of the invention has been shown and described in some detail, there is no intention to thereby limit the invention to such embodiment and application, but, on the other hand, the appended claims are intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention.

The illustrative digesting apparatus embodies a suitable framework 11 having a storage cabinet in the bottom closed by doors 12. A series of flasks 14 are received on individual heating units 15 (Fig. 2) by means of which the contents of of the flasks is boiled. Each of these heaters includes a ceramic disk 15ª in which the flask rests, as well as an electric resistance heater (not shown) controlled by a corresponding switch 15ᵇ. The vapors issuing from the flasks are received in the fume tube assembly 10 and pass through it horizontally into a stack 16ª through which they move upwardly. The flow of vapors through the stack and fume tube assembly is accomplished in the usual manner by induced draft from a blower (not shown) housed within the storage cabinet 12 and discharging into the stack 16ª through a conduit 16.

The fume tube assembly 10 embodies a main fume tube 17 preferably made of some strong and corrosion resistant material such as tellurium lead. It has a flattened side or face 17ª, being generally D-shaped in cross-section (Fig. 2). To this flat face 17ª is fixed a series of hoods 18 which serve to receive the necks of the various flasks 14. The hoods 18 may also be made of tellurium lead and united to the fume tube in a gas tight joint by fusion of metal. The inner surfaces of the main fume tube 17 are smooth and free of protrusions or obstructions (see Fig. 2) so that there is no danger of eddy currents being set up within the main fume tube which would interfere with the proper flow of vapors through it.

The hoods 18 are of truncated cone shape and each defines a chamber of substantial volume. Consequently, if vapor should be emitted from the associated flask in a sudden puff it will be received within the hood 18 and then permitted to pass at a substantially uniform rate into the main fume tube 17 with a resultant constancy of pressure in the latter. Each of the hood chambers communicates with the main fume tube 17 through a hole 19 in the fume tube face 17ª which is located substantially centrally of the hood and in alinement with the mouth of the flask so as to afford a good draft from the flask mouth into the fume tube during normal operation.

The outer ends of the hoods 18 are apertured to receive the flask necks and these entrance apertures are bordered by inturned flanges 20. With this arrangement it will be seen that there is no

nipple or similar projection which must be inserted into the flask mouth to hold it in position. Consequently, there is no danger of contaminating the contents of a flask due to material left on the nipple from another flask in which it has previously been inserted.

To prevent dripping of condensate from the flask mouth the hoods are fashioned to trap and drain away any such condensate. In particular, the wall 17a on the fume tube faces downwardly at an angle of about 60° so that the hood axis is upwardly inclined at an angle of about 30° (Fig. 2). The taper of the hood side wall is great enough, however, so that the bottom of the hood is in fact inclined downwardly from the flask mouth toward the fume tube. At the bottom of this drain slope a hole 21 establishes communication to the interior of the fume tube. At the upper end of the sloping bottom of the hood the flange 20 projects upwardly, however, and the neck of the flask rests directly on the sharp edge of this flange. Consequently, any liquid running out of the flask mouth and down along the lower side of the neck is intercepted by the sharp edge of the flange and diverted into the bottom of the hood. In the latter it flows down the sloping bottom wall of the hood and through the hole 21 into the fume tube where it is carried away by the exhaust into the pipe 16 from which it drains through a drip connection 16b. To prevent dripping of condensate formed in the hood 18 itself the flange 20 is extended entirely about the opening in the hood. In this way the flange forms a gutter over the top of the flask neck (Fig. 2) which catches any condensate which forms on the inner side of the top of the hood. Since the top of the hood slopes down to this gutter the condensate runs down into the gutter and is directed by it into the bottom of the hood from which it passes out through the hole 21 as previously noted. In this way the apparatus is maintained in a clean and sanitary condition.

From the foregoing it will be apparent that the flask necks can be quickly inserted into and removed from the hoods 18. In no case is there danger of contamination of the flask contents by insertion of a nipple or similar connecting device into the flask mouth since none is required. Furthermore, the flow of vapors through the main fume tube 17 is regular and uniform since the effects of any sudden puffs of vapor emitted from the flasks are dissipated in the hoods 18 and since there are no protrusions in the fume tube itself to set up eddy currents. Additionally, the hoods serve to trap and drain away condensate, eliminating undesirable drip. Despite these numerous advantages, the apparatus is simple to construct and extremely compact in form.

I claim as my invention:

1. In a digestion apparatus, a fume tube assembly comprising a horizontally extending main fume tube, a hood on the exterior of said fume tube projecting laterally therefrom and located below the top of said tube to minimize the overall height of the assembly, said hood being apertured on its outer side for the reception of an upwardly inclined neck of a flask, said fume tube having a small hole therein positioned for alinement with the mouth of a flask neck inserted in said hood aperture and establishing communication between the interior of the hood and tube, such alinement of said hole serving to provide maximum draft from the flask into the fume tube and yet said hole being small enough to cause the pressure of sudden puffs of vapor from the flask to be dissipated in the large volume of the hood.

2. In a digestion apparatus, a fume tube assembly comprising a horizontally extending main fume tube of generally D-shaped cross section with the flat side of the D facing laterally and downwardly, a hood of truncated cone shape located exteriorly of the tube on said flat face thereof, the nose of said hood being apertured for the reception of an upwardly inclined neck of a flask inserted therein, said fume tube having a small hole in said flat face thereof disposed for alinement with the mouth of a flask neck inserted in said hood, the aperture in said hood nose being bordered by an inturned flange presenting an upstanding sharp edge on which the inserted neck of the flask rests to intercept liquid flowing down the exterior of such neck, the lower side of said hood being inclined downwardly away from said flange to drain away liquid intercepted by it, and said fume tube having a second hole therein establishing communication between its interior and that of the lower portion of the hood for the flow of the drained liquid into the fume tube.

3. In a digestion apparatus, a fume tube assembly comprising a main fume tube, an exterior hood on one side of the tube apertured to receive the neck of a flask, said tube having a hole therein to establish communication between its interior and that of the hood, said hood presenting a sharp-edged upwardly extending flange along the lower edge of the entrance aperture therein for the inserted neck of a flask to rest upon to intercept liquid flowing down the outer side of the flask neck, and the interior of said hood being shaped to drain intercepted liquid away from said flange into the interior of the fume tube.

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