

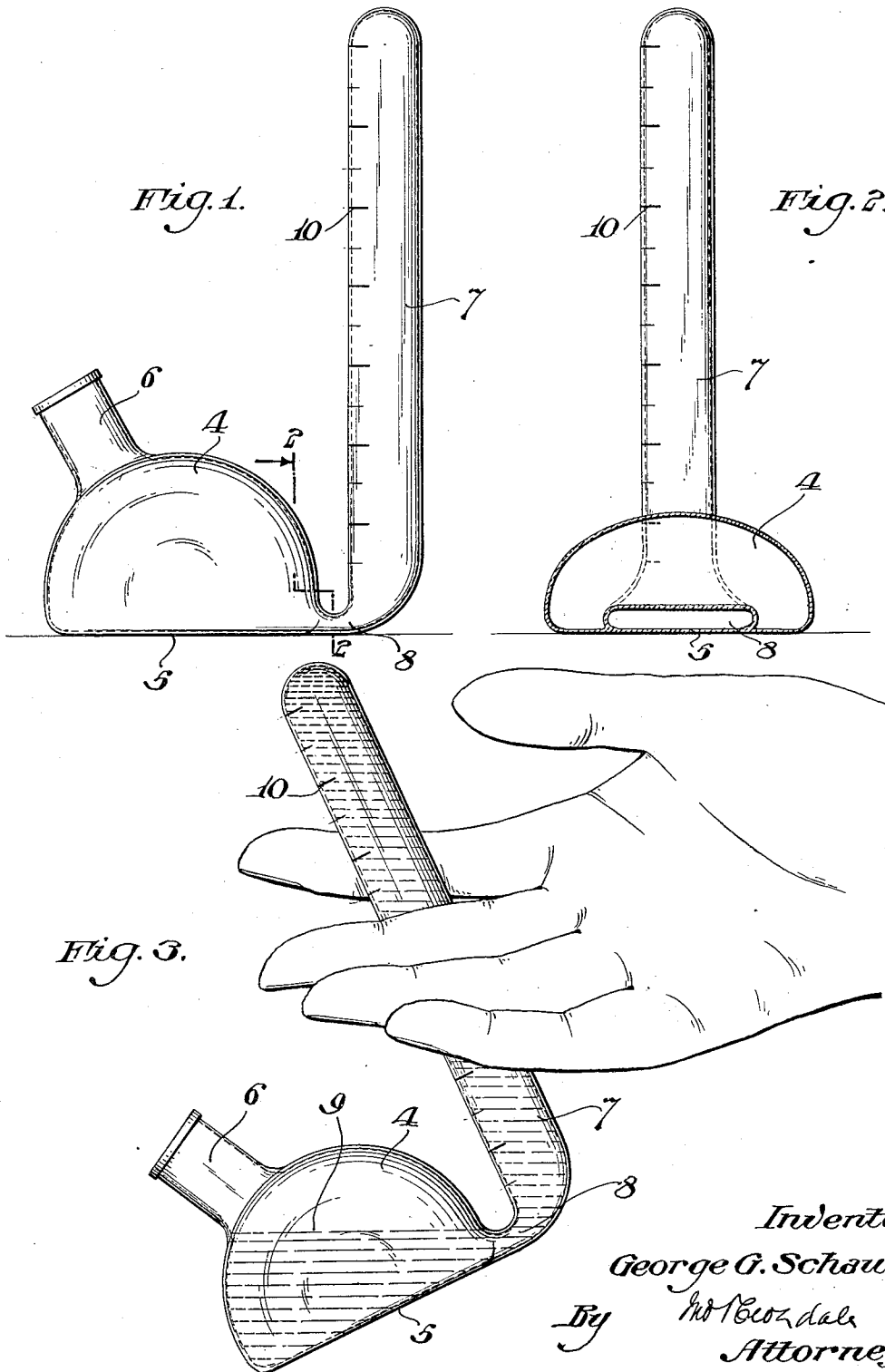
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FERMENTATION DEVICE

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## UNITED STATES PATENT OFFICE

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## FERMENTATION DEVICE

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My invention relates to fermentation devices. The object is to provide a device for conducting tests by fermentation, and comprises a one-piece or integral structure which is of extreme simplicity, which is inexpensive to manufacture and not easily broken, which is easily cleaned, which occupies but small space, especially in the vertical direction and which is not easily upset.

In its essential construction the device comprises in an integral body a reservoir portion and a tube or gas receiving portion, and the body is so formed as to provide the bottom wall of the reservoir portion in a flat or horizontal plane, with the tube or gas receiving portion having its lower end associated with said reservoir portion in close relationship with said flat bottom portion, so as to form a structure that will rest firmly upon said bottom portion with the center of gravity well within the margin thereof so that there will be no danger of upsetting. The tube or gas receiving portion is in communication with said reservoir portion at the bottom thereof, and without obstruction.

Referring to the drawings, which illustrate merely by way of example a suitable embodiment of my invention:

Fig. 1 is a side elevation when resting normally on a supporting surface.

Fig. 2 is a cross-section on line 2, 2 of Fig. 1.

Fig. 3 is an elevation showing the usual position of the device when supported between the fingers.

In Fig. 1 the device is shown in normal operative position when resting upon a horizontal supporting surface. The reservoir portion 4 is provided with the flat or slightly convex bottom 5 and the open neck portion 6. The reservoir portion is of dome-shaped formation having its axis perpendicular to the plane of the bottom. The neck portion 6 is positioned to one side of said axis, at an inclination thereto. The normally vertical tube or gas collector 7 is closed at the top and is provided with the right angle bend 8 which connects with the reservoir portion 4 at or near the bottom thereof on the opposite side from that of the neck portion 6. At the

point of connection between the tube 7 and reservoir 4, the tube 10 is preferably slightly flattened forming an oblong opening 8 between the tube and the reservoir, the greater axis of the said opening extending horizontally. This arrangement is made in order to keep the opening 8 as near the bottom of the reservoir as possible, so that when the device is tilted as shown in Fig. 3 in the manner hereinafter described, the danger of the liquid flowing from the tube back to the reservoir is obviated. The water level in the reservoir when so tilted is indicated by the numeral 9. The tube portion 7 is provided with the usual graduation marks 10.

In operation:

The nutrient medium, containing the sugar or the like is introduced into the reservoir 4. The device and contents are then sterilized and the subject-matter to be tested is then introduced into the medium. The reservoir is more than half filled with the medium and subject-matter to be treated. After thorough mixing of the medium and subject-matter the device is tilted to cause the liquid to flow into and fill the tube 7.

It is sometimes necessary to return liquid from the tube 7 back to the reservoir 4, before beginning the fermentation process. This is secured by tilting the flask in the opposite direction from that above described. It is important that, in these tilting operations, the liquid shall not contact with the cotton stopper which closes the filling neck 6. The desired result, in this respect, is accomplished by the proper conformation and capacity content of the reservoir and by the proper disposition, as shown, of the filling neck with respect to the reservoir conformation, so that, in either tilting operation to fill or to empty the tube, no liquid enters the filling neck 6. It is also important, in case the flask is overset after fermentation, that the liquid should not enter the filling neck and also that the gas which has accumulated in the top of the tube shall not return to the reservoir. The desired result in this respect is accomplished by the formation, as shown, of the part 8, connecting the tube with the reservoir, relatively to said reservoir forma-

tion, so that said connecting part 8 shall not be higher than the closed end of the tube, when the flask is at rest with the tube in substantially horizontal position.

5 It frequently happens that several of these devices, when so filled, are lifted by engaging the tubes between the several fingers of the hand. This permits the tubes to assume an inclined position as in Fig. 3, and it is important that in so tilting, the liquid remain-  
10 ing in the reservoir shall not assume a level below the top of opening 8, as in which case air would flow into the tube, and thus permit the fluid to flow therefrom to the reservoir. The level of the liquid in the reservoir, when  
15 so tilted, is indicated by the line 9 which is sufficiently above the top of opening 8.

The apparatus with its contents is subjected to the usual incubator process and  
20 the gas formed or generated within the apparatus will rise to the top of the tube displacing the liquid therein. Suitable graduations or horizontal marks 10 are provided upon the tube at proper intervals to represent  
25 the amount of the gas content.

The particular advantage of the device is that it is integral and self-contained, needing no special supporting device. There are  
30 no separate parts to be assembled. It is inexpensive to manufacture and easy to handle and clean.

What I claim is:—

1. A fermentation flask comprising, in an  
35 integral structure, a semi-spherical dome-shaped reservoir symmetrical about a vertical axis, the bottom of which forming a substantially flat supporting base, a communicating tube extending vertically from the bottom of  
40 the reservoir and to one side thereof to a point substantially above the horizontal plane of the top thereof, and permanently closed at its upper end, and a filling neck  
45 extending from the upper part of the reservoir, positioned to one side of the vertical axis thereof and on the opposite side thereof from that of the vertical tube.

2. A fermentation flask comprising, in an  
50 integral structure, a semi-spherical dome-shaped reservoir symmetrical about a vertical axis, the bottom of the reservoir forming a substantially flat supporting base, a communicating tube extending vertically from  
55 the bottom of the reservoir and to one side thereof to a point substantially above the horizontal plane of the top thereof, and permanently closed at its upper end, and a filling neck extending from the upper part of  
60 the reservoir, positioned to one side of the vertical axis thereof and on the opposite side thereof from that of the vertical tube, said filling neck being so positioned and at such  
65 an angle with respect to said vertical axis as to permit the necessary tilting of the reservoir to cause the flow of liquid from the reservoir to fill the tube without spilling into

the filling neck and also to allow the complete emptying of said vertical tube into the reservoir without spilling into the filling neck.

3. A fermentation flask comprising, in an  
70 integral structure, a semi-spherical dome-shaped reservoir symmetrical about a vertical axis, the bottom of the reservoir forming a substantially flat base, a tube extending vertically from the bottom of the reservoir and to one side thereof to a point substantially  
75 above the horizontal plane of the top thereof, and permanently closed at its upper end, and a filling neck extending from the upper part of the reservoir, positioned to one side of the vertical axis thereof and on the opposite side  
80 thereof from that of the vertical tube, the several parts being relatively proportioned and disposed to permit the flask to lie longitudinally upon a horizontal supporting surface while maintaining about ten per cent of  
85 gas at the closed end of the tube and also maintaining the liquid in the flask separated from the stopper in the filling neck.

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