April 26, 1932. E. H. FISHER 1,855,909

SHAKING APPARATUS

Filed April 16, 1931

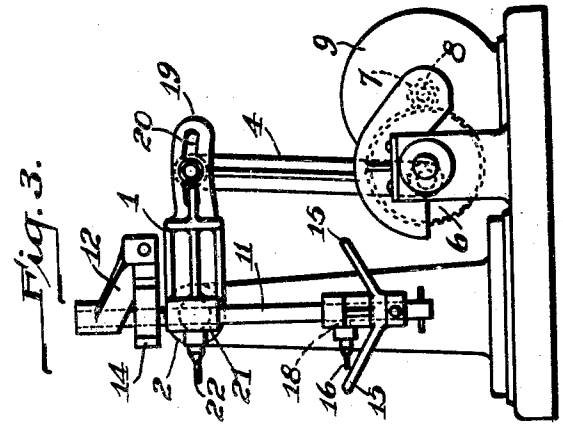


Fig. 3.

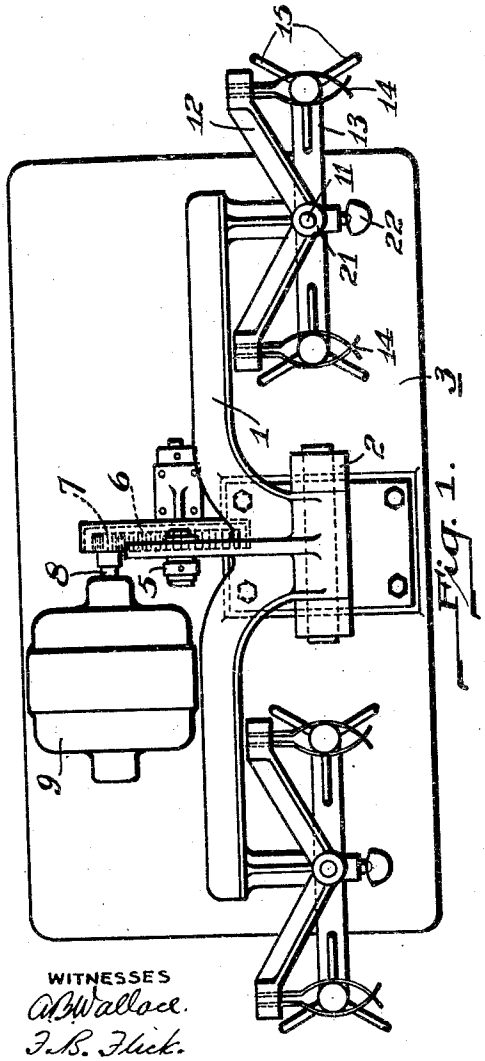


Fig. 1.

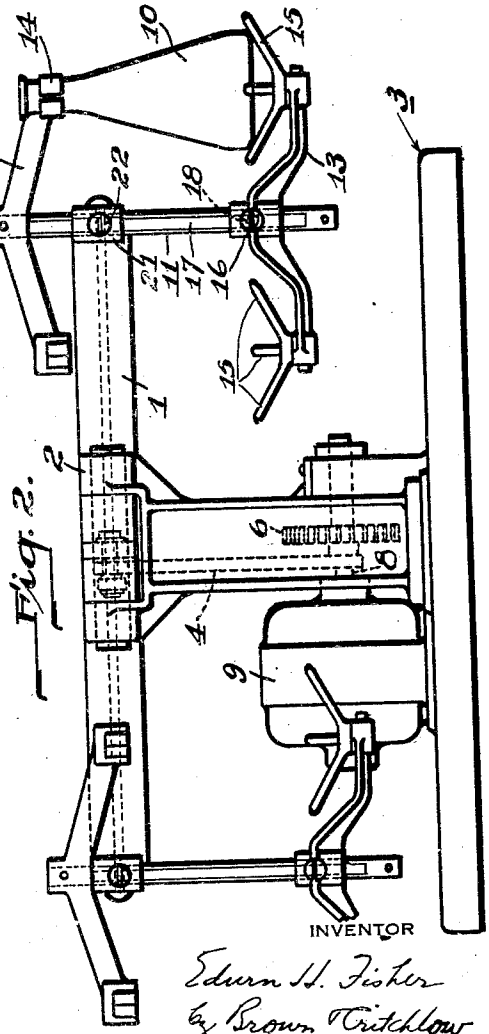


Fig. 2.

WITNESSES

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UNITED STATES PATENT OFFICE

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SHAKING APPARATUS

Application filed April 16, 1931. Serial No. 530,710.

This invention relates to shaking machines, and especially to laboratory apparatus of this type.

The objects of the invention are to provide oscillatory shaking apparatus which is adapted to accommodate containers of various sizes and shapes, is capable of providing violent agitation or gentle rocking, is of simple and sturdy construction, and which is adjustable to alter the shaking characteristics to meet varying conditions and requirements.

The invention will be described in connection with the accompanying drawings in which Fig. 1 is a plan view; and Figs. 2 and 3 are front and side elevations, respectively, of its preferred embodiment.

The shaking apparatus provided by this invention comprises an oscillably mounted vertically disposed container clamp which is adjustable to accommodate flasks of various sizes, and means for oscillating the clamp and its retained container. The degree of agitation of the liquid in the container will depend in part upon the contour of the container, the level of the liquid, and its viscosity and content of solid matter. In order to compensate for these and other factors, and to control the type and degree of agitation, means are provided for varying the radius of oscillation of the container, and preferably also the amplitude of oscillation.

Having reference to the drawings, the apparatus shown comprises a rocker shaft 1 journalled in a bearing 2 rigidly supported in a frame indicated generally by the numeral 3. Shaft 1 is oscillated by any suitable means, for example through a connecting rod 4 actuated by a crank 5 connected to a pinion 6 which meshes with a gear 7 mounted on shaft 8 of a motor 9.

The liquid to be shaken is contained in a flask 10 supported in a container clamp carried by shaft 1 and provided with upper flask-gripping and lower flask-supporting members. The apparatus shown is provided with two clamps each adapted to carry two flasks. Each clamp comprises a vertically disposed rod 11 connected to shaft 1 and provided at its upper and lower ends with bifurcated brackets 12 and 13, respectively. Connected to the arms of bracket 12 are gripping members 14, such as spring clips, adapted to engage the neck of a container, such as flask 10. Bracket 13 is provided with supporting members, and preferably these are interchangeable to accommodate containers having bottoms of different shape and size. The flask support shown comprises upwardly inclined fingers 15 radiating from a body portion removably held in the bracket. This supporting member may be adapted to hold tubes, bottles, flasks of various contours, and the like, and for brevity of reference all such containers are designated herein as flasks.

The clamp is adjustable to accommodate flasks of varying height. As shown in the drawings, bracket 13 is slidably mounted on rod 11, a set screw 16 being provided to lock it at any desired height. In order to keep bracket 13 from rotating when the apparatus is in use, rod 11 is provided with a slot 17 which receives a pin 18 passed through the bracket.

In the use of the apparatus described actuation of motor 9 imparts an oscillatory motion to shaft 1 and the clamps. The flasks are thus swung backward and forward through an arc whose amplitude depends upon the travel of the connecting rod. Such oscillation gives a distinct shaking motion which gives more thorough and more satisfactory agitation than that had with swirling motion.

In the apparatus just described the amplitude of oscillation, and hence the travel of the clamps, is fixed. A particular feature of the invention resides in the provision of means for adapting the apparatus to varying conditions, such as varying the degree of agitation. This may be done by varying the stroke of the connecting rod. As shown best in Fig. 3, shaft 1 is provided with an arm 19 having an arcuate slot 20 in which a pin carried by connecting rod 4 moves. The stroke of the connecting rod may thus be adjusted by changing the setting of the pin in slot 20. This makes it possible to vary the amplitude of oscillation, or arc through which the flasks are swung, according to the need.

It has been found that in some instances waves will be set up in the liquid which will

tend to cause the liquid to splash from the container, and this is, of course, objectionable. This phenomenon is governed in part by the degree of agitation, which in turn is controlled by the amplitude of oscillation and the height of liquid in the flask, or rather its distance from the axis of oscillation. This effect may be controlled in some instances by changing the amplitude of oscillation. But such control may not be fully satisfactory for all cases, because to prevent it in this manner may necessitate reducing the degree of agitation to an undersirable extent.

The invention further provides means for controlling the agitation to prevent splashing, by providing for adjustment of the flask to shift the radius of oscillation, i. e. the position of the liquid level with respect to the axis of oscillation. To this end the clamp is adjustable vertically in shaft 1. As seen in the drawings shaft 11 is slidable in a sleeve 21 formed on shaft 1, and the shaft may be locked in any desired position by a set screw 22.

The apparatus provided by the invention thus affords a wide variety of operating conditions. It is adapted to shake containers of various shapes and sizes, and thus is adapted to substantially all laboratory procedure. Furthermore, it provides satisfactory agitation, its adjustability to meet all variations in liquid characteristics rendering it flexible in operation. Thus, by suitably adjusting the arc of oscillation, or the radius of oscillation, the degree of agitation can be varied from gentle rocking to violet agitation. At the same time all tendency to splash may be repressed similarly. These adjustments are made conveniently and quickly, and for routine work an adjustment once found may be retained, as in the case of routine laboratory determination of sulfur in steel.

It will be understood that the gist of the invention resides in a shaking apparatus embodying oscillably mounted container clamps adjustable not only to accommodate a wide variety of containers, but also to alter the shaking characteristics, or character of agitation obtained. Therefore the invention is not restricted to the four-flask embodiment shown, nor to the particular details given.

According to the provisions of the Patent Statutes, I have explained the principle and mode of operation of my invention, and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A laboratory shaking machine comprising in combination a frame, a horizontal rocker shaft journalled in said frame, a clamp comprising a rod carried by said shaft and adjustable vertically thereof, an upper flask-gripping member connected to said rod, and a lower flask-supporting member slidably carried by said rod for adjustment to flasks of different heights, and means operatively connected to said shaft to oscillate it, adjustment of said rod relative to said shaft varying the radius of oscillation of a flask supported by the clamp.

2. A laboratory shaking machine comprising in combination a frame, a horizontal rocker shaft journalled in said frame, a clamp comprising a rod carried by said shaft and adjustable vertically thereof, said rod being provided with upper flask-gripping and lower flask-supporting members one of which is adjustable vertically relative to the other for adjustment to flasks of different heights, and means operatively connected to said shaft to oscillate it, adjustment of said rod relative to said shaft varying the radius of oscillation of a flask supported by the clamp.

In testimony whereof, I sign my name.

EDWIN H. FISHER.