

July 1, 1941.

J. L. VAN ARKEL

2,247,978

SHAKER

Filed April 18, 1940

2 Sheets-Sheet 1

Fig. 1

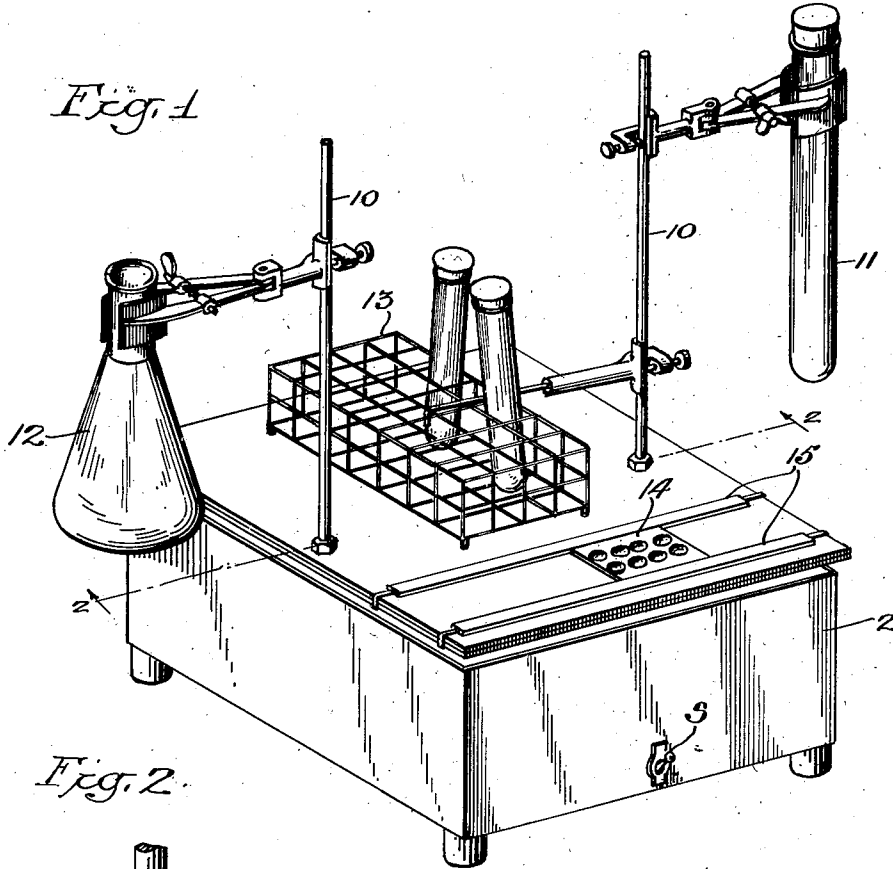
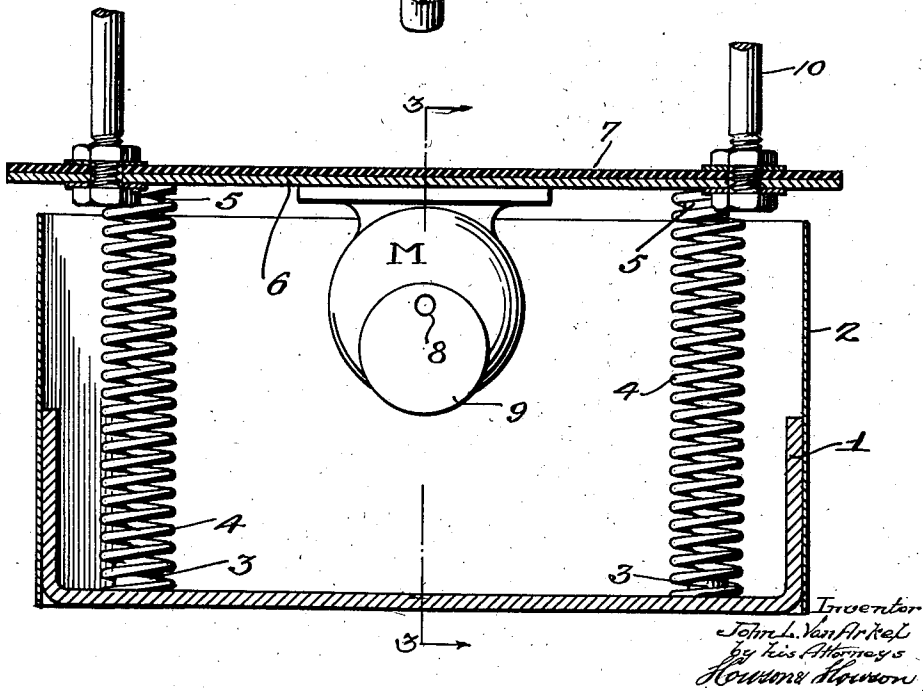


Fig. 2



July 1, 1941.

J. L. VAN ARKEL

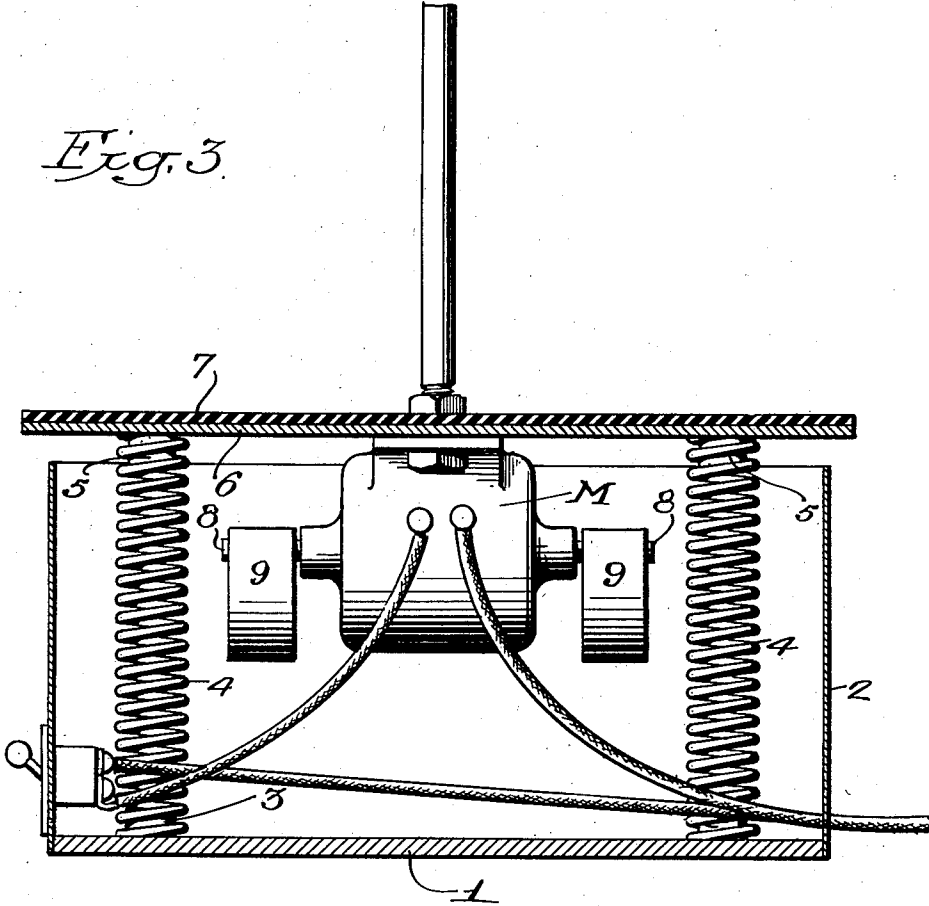
2,247,978

SHAKER

Filed April 18, 1940

2 Sheets-Sheet 2

Fig. 3.



Inventor
John L. Van Arkel
by his Attorneys.
Henson & Henson

UNITED STATES PATENT OFFICE

2,247,978

SHAKER

John L. Van Arkel, Haddonfield, N. J., assignor to
Arthur H. Thomas Company, Philadelphia, Pa.,
a corporation of Pennsylvania

Application April 18, 1940, Serial No. 330,391

4 Claims. (Cl. 259—72)

This invention relates to new and useful improvements in shakers and more particularly to shakers specially adapted for use in clinical and like laboratory work.

In clinical and other laboratory work many occasions arise which require the agitation of one or more substances to effect the proper mixture, separation or other physical treatment thereof. In numerous instances the severity and length of time required for such physical treatment is not only fatiguing, if required to be done manually, but also takes the technician away from other work and even then only one or two vessels can be agitated or shaken at one time by an individual. Recently, therefore, there has been a demand for an inexpensive compact agitation or shaking device which is generally useful in the physical agitation of laboratory specimens and which may be employed to treat a number of similar or different specimens at one time.

With the foregoing observations in mind, an object of the present invention is to provide a novel shaker or agitator for laboratory and like uses which is readily adaptable for the various physical treatments required in laboratory work and which may be employed to treat a number of similar or different types or kinds of specimens at the same time.

Another object of the invention is to provide a shaker or agitator of the character set forth which embodies a novel gyratory agitating or shaking movement and which is characterized by its comparative simplicity and relatively inexpensive cost to manufacture.

Another object of the invention is to provide a shaker of the type described which occupies a small amount of space and which is very quiet and economical in operation.

More particularly the invention resides in certain novel parts and features of the shaker and the construction, arrangement and operation thereof.

These and other objects of the invention and the various features and details of the construction and operation thereof are hereinafter more fully set forth and described and shown in the accompanying drawings, in which:

Figure 1 is a view in perspective of a shaker made according to and embodying the present invention.

Figure 2 is an enlarged view in section taken on line 2—2, Figure 1; and

Figure 3 is a view in section taken on line 3—3, Figure 2.

Referring now more particularly to the drawings, reference numeral 1 designates a channel-shaped base structure of relatively heavy material such as metal, and surrounding the four sides of this base member 1 is a casing 2 of sheet metal or other suitable material. As shown, this casing 2 extends an appreciable distance or height above the base member 1.

Secured in any suitable manner as by means of a stud bolt 3 at or adjacent each of the four corners of the base member 1 is a helical or coiled spring 4 and these springs 4 are vertically disposed with respect to said base member 1 and extend to a height or distance slightly above the upper edges of the surrounding casing structure 2.

The upper ends of these springs 4 are similarly secured, as indicated at 5, to the underside of a platform or table-like structure 6 at or adjacent the four corners respectively thereof as shown. This platform or table 6 preferably projects a short distance beyond the casing 2 and the upper surface thereof is preferably covered or coated with a sheet or thickness of sponge rubber or the like 7 so as to provide a resilient support for articles placed upon the platform as well as to provide the same with a relatively non-skid surface.

Except for their connections to the base member 1 and the platform 6 the springs 4 are without support and since they constitute the sole support for said platform 6 the latter is substantially floating and hence relatively free to move with respect to the base structure when suitably actuated.

A motor M controlled by a switch S and having a double ended shaft 8 of conventional form is secured centrally to the underside of the platform 6 in such manner that the said shaft 8 thereof has its axis horizontally disposed and extends parallel to and below the said platform 6. Eccentrically secured upon the motor shaft 8 at each end thereof is a circular member 9 of proper weight, and it will be observed that while these members 9 are eccentrically secured upon said shaft 8 they are not oppositely disposed with but have their geometric centers in alignment as will be seen by reference to Figure 3 of the drawings.

A particular feature of the invention resides in the provision upon the platform 6 of supporting rods 10 to which clamps may be secured for supporting flasks, tubes and like laboratory equipment. These rods 10 are secured to the platform or table 6 at their lower ends only and

extend vertically upward therefrom without other support so that their upper end portions are free to gyrate.

In the form of the invention illustrated, a pair or two of such rods 10 are shown secured to the platform 6 and these are secured centrally along opposite side edges of the said platform 6 at respectively opposite sides of the axis of the shaft 8 of the motor M. It is to be understood, of course, that additional rods 10 may be similarly secured to the edge portions of the platform 6 at opposite sides of the axis of the motor shaft 8 as desired and as well along the front and rear edges of said platform, although the gyratory movement imparted to the rods in such regions is not as great as that imparted thereto when positioned in the particular location and relation shown in the drawings.

The provision of these vertical supporting rods 10 greatly broadens the utility and field of usefulness of the present invention in that by the use of laboratory clamps of the conventional type any of the usual laboratory vessels of various types may be secured thereto and their contents subjected to the gyratory shaking action of the device. As illustrative of this wide adaptation of the device, I have shown mounted or otherwise secured thereon by means of the rods 10 and suitable clamps, a test tube 11, flask 12, and a test tube rack 13. In addition, various laboratory equipment such as, for example, Kline and other type slides 14, etc., may be supported or secured directly upon the surface 7 of the platform 6 by means of detachable resilient straps 15 or any other means without employing or utilizing the rods 10.

In operation of the device, since the motor shaft 8 is horizontally disposed and the eccentric members 9 thereon rotate in vertical planes the movement imparted to the platform 6 tends to follow a generally elliptical path in the plane or planes of rotation of said eccentric members 9. However, the vertical component of this otherwise elliptical movement of the platform 6 is opposed by the tension of its supporting springs 4 and apparently this component in part is resolved into a lateral gyratory movement since the said platform 6 seems actually to follow a combined vertical and lateral elliptical course thus imparting to substances subjected to the action of the device a combined shaking and whirling action or movement.

This whirling effect or action manifests itself particularly in the treatment of liquids in vessels of the smaller order of diameters such as the test tube 11 and in inverted flasks such as 12 when such vessels are secured adjacent the upper end of a rod 10 and when the other rod of that pair has also secured to it another vessel or an equivalent weight.

This distinct manifestation of the whirling action imparted to fluids supported from the rods 10 apparently is due to a decided whip action that is given the upper free end of said rods by the motor M and the eccentric members 9 acting through the platform 6 for as the position of the supporting clamp is moved downward along the rods 10 the violence of the whirling action gradually diminishes. Furthermore, this whirling action becomes openly apparent to the human eye only if a similar vessel or an equivalent weight is supported by a corresponding rod and it is thought that this either balances or dampens such of the components or harmonics of the vibratory motion as may be neces-

sary to produce the violent whirling action which is manifest under these circumstances.

Maximum agitation of substances in vessels supported from the support rods 10 is observed and takes place when such vessels are supported from said rods 10 by clamps or other means disposed or extending at right angles or perpendicular to the axis of rotation of the motor shaft 8, and the violence of this agitation diminishes as the vessels are moved circumferentially of the rods 10 reaching a minimum when the clamps or other supporting means are disposed parallel to the axis of rotation of the said motor shaft 8. In addition, it will be clear that further variation in the amplitude of the gyratory action produced may be varied as desired by changing the positions of the eccentric members 9 so that their geometric centers are in various positions of misalignment instead of in alignment as shown in the particular embodiment of the invention illustrated in the drawings.

From the foregoing it will be seen that the present invention provides a novel agitating or shaking device for laboratory and like uses which not only is of general utility in the physical treatment such as shaking, mixing, separating, etc., of a number of similar or different laboratory specimens, but which also affords one or more entirely novel gyratory motions for such purposes. It will be observed also that the device of the present invention is relatively simple and compact and capable of relatively inexpensive manufacture thus making it available to any person having use therefor.

The device is further characterized by its extremely quiet and economical operation and this is a feature not found in analogous devices heretofore available and designed for one or another specific use or purpose. The device is advantageous also in that it is capable of many and varied laboratory uses involving the physical treatment of specimens and by its design and construction it is not limited to any one specific or special use as is the case of the majority of agitating or shaking devices heretofore available to the laboratory technician.

While one particular embodiment of the invention has been herein illustrated and described, it is not intended that the invention be limited or confined to such disclosure but that changes and modifications may be made, incorporated and embodied therein as desired within the scope of the annexed claims.

I claim:

1. In a device of the character described, a horizontal platform resiliently supported for relative freedom of movement, a shaft carried by said platform at the underside thereof, eccentric members secured upon said shaft, a plurality of relatively slender elongated support rods vertically disposed upon the platform and secured thereto at their lower ends only so that the remaining portions thereof are freely disposed above said platform, a bracket secured to each support rod adjacent its free upper ends and arranged to support a container laterally adjacent such rods, and means for rotatively driving the shaft and its eccentric members to impart a gyratory shaking movement to the platform, the gyratory shaking movement of the platform in turn operating to impart a whip-like gyration to the free end portions of said support rods and the containers supported thereby.

2. In a device of the character described, a

horizontal platform resiliently supported for relative freedom of movement, a shaft carried by said platform at the underside thereof with its axis extending parallel to the platform, eccentric members secured upon said shaft, at least one pair of relatively slender elongated support rods vertically disposed upon the platform and secured thereto at their lower ends only so that the remaining portions thereof are freely disposed above said platform, said rods being respectively located at corresponding positions centrally along opposite edges of the platform, a bracket secured to each support rod adjacent its free upper ends and arranged to support a container laterally adjacent such rods, and means for rotatively driving the shaft and its eccentric members to impart a gyratory shaking movement to the platform, the gyratory shaking movement of the platform in turn operating to impart a whip-like gyration to the free end portions of said support rods and the containers supported thereby.

3. In a device of the character described, a base structure, a horizontal platform resiliently supported for relative freedom of movement with respect to said base structure, a shaft carried by said platform at the underside thereof, eccentric members secured upon said shaft, at least one pair of relatively slender elongated support rods vertically disposed upon the platform and secured thereto at their lower ends only so that the remaining portions thereof are freely disposed above said platform, said rods being respectively located at corresponding positions along opposite edges of the platform and at respectively opposite sides of the shaft, a

5 bracket secured to each support rod adjacent its free upper ends and arranged to support a container laterally adjacent such rods, and means for rotatively driving the shaft and its eccentric members to impart a gyratory shaking movement to the platform, the gyratory shaking movement of the platform in turn operating to impart a whip-like gyration to the free end portions of said support rods and the containers supported thereby.

10 4. In a device of the character described, a base structure, a horizontal platform resiliently supported for relative freedom of movement with respect to said base structure, a shaft carried by said platform at the underside thereof with its axis extending parallel to the platform, eccentric members secured upon said shaft, at least one pair of relatively slender elongated support rods vertically disposed upon the platform and secured thereto at their lower ends only so that the remaining portions thereof are freely disposed above said platform, said rods being respectively located at corresponding positions centrally along opposite edges of the platform and at respectively opposite sides of the axis of the shaft, a bracket secured to each support rod adjacent its free upper ends and arranged to support a container laterally adjacent such rods, and means for rotatively driving the shaft and its eccentric members to impart a gyratory shaking movement to the platform, the gyratory shaking movement of the platform in turn operating to impart a whip-like gyration to the free end portions of said support rods and the containers supported thereby.

35 JOHN L. VAN ARKEL.