W. LINDSAY.

AGITATOR.

APPLICATION FILED DEC. 26, 1916.

1,242,824. Patented Oct. 9, 1917.

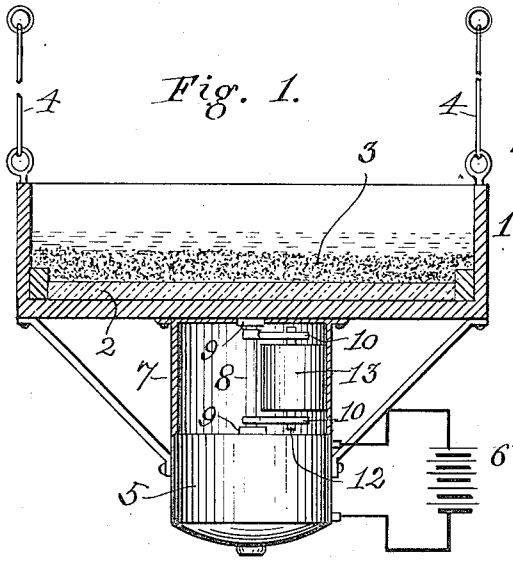


Fig. 1.

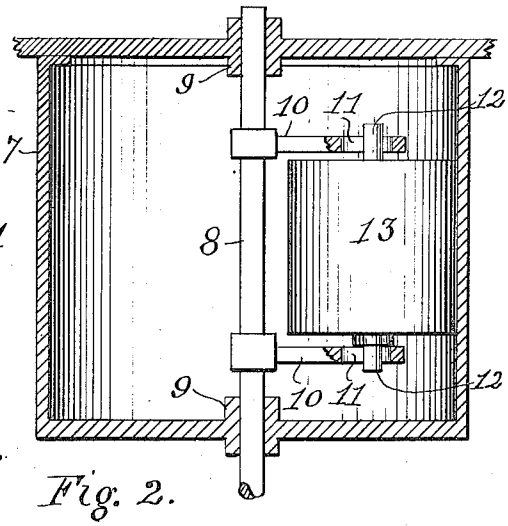


Fig. 2.

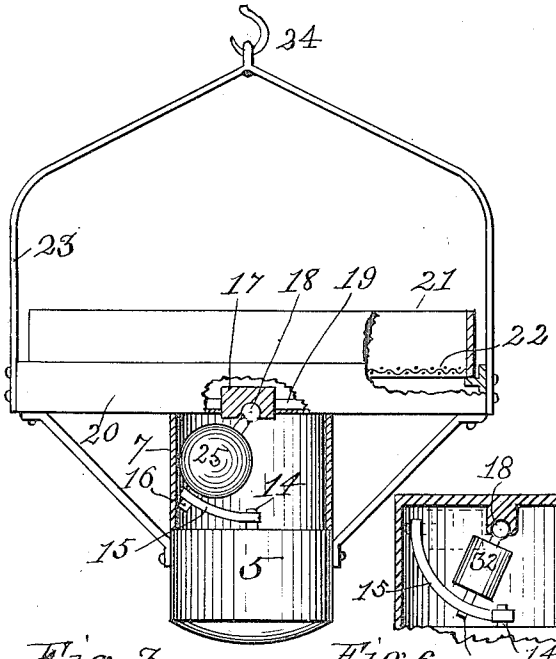


Fig. 3.

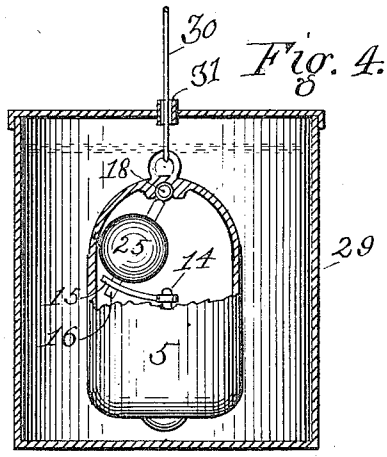


Fig. 4.

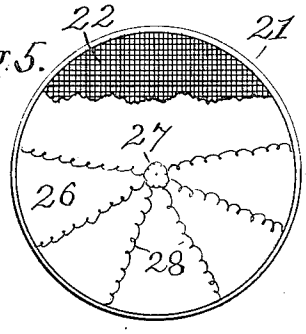


Fig. 5.




Fig. 6.

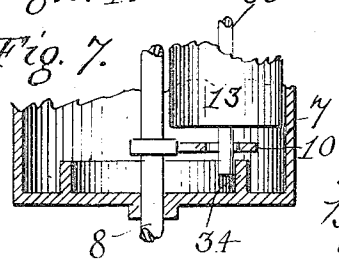


Fig. 7.

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# UNITED STATES PATENT OFFICE.

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## AGITATOR.

1,242,824. Specification of Letters Patent. Patented Oct. 9, 1917.

Application filed December 26, 1916. Serial No. 138,946.

*To all whom it may concern:*

Be it known that I, WILLIAM LINDSAY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Agitators, of which the following is a description, reference being had to the accompanying drawings, forming a part of this specification, in which corresponding numerals of reference in the different figures indicate like parts.

The object of my invention is to provide a simple, cheap and effective means for producing a rapid vibratory, oscillatory gyratory, seismic or other disturbing or shaking movement or agitation so as to enable said movement to be imparted with a minimum expenditure of power to any structure or container or to the contents thereof whether composed of loose particles or of varying mixtures of solids or liquids or both, for the purpose of sifting, agitating, triturating, mixing, grinding, abrading or imparting intermittent movement to structures, vessels or materials requiring mechanical agitation, and that in such a manner as to approach as nearly as possible, what may be termed harmonic rhythm, or in other words, so that the rhythm of the prime-mover may harmonize with that of the mass to be agitated so that conflicting or incomplete vibrations requiring an excess of power to overcome, may be avoided;—all of which is hereinafter more particularly described and definitely pointed out in the claims.

In the drawings:

Figure 1, is an elevation partly in central vertical section of a device for grinding or surfacing glass or other plates by means of attrition or abrasion, my improved agitator being shown in operative connection therewith,

Fig. 2, is an enlarged central vertical sectional view of a portion of said agitator showing a revoluble weight arranged to be rotated by the motor shaft,

Fig. 3, is a view of a modification, showing, partly in elevation and partly in section, a sifting device having my improvement applied thereto,

Fig. 4, is a vertical sectional view of a liquid container showing the agitator suspended therein for agitating the liquid contents as a result of its vibration,

Fig. 5, is a diagrammatic view in plan of a sifter or other similar container showing the character of the movement imparted to loose particles placed therein,

Fig. 6 is a central section of a casing and weight showing a modified means for limiting the centrifugal path of the weight, and

Fig. 7, is a vertical section of a portion of the casing represented in Fig. 2, showing a modified means for limiting the centrifugal movement of the weight.

Referring to the drawings, 1, Fig. 1, indicates generally a receptacle for the reception of a glass, metal or other plate 2, with sand or other suitable abrading material 3, and liquid, adapted to impart a ground or mat surface to the plate as a result of the movement thereover and in contact therewith of the loose abrading material when the container is agitated. The container is suspended in a horizontal position by means of cords, chains or rods 4, so as to enable it to be freely moved in a horizontal plane. Rigidly attached to the bottom of the suspended receptacle is an electric motor 5, of any well known construction, in operative connection with a source of electric energy 6. Extending above the motor casing proper, with which it may be integral or to which it may be attached, is a hollow cylindrical casing 7, an enlarged view of which is shown in Fig. 2. The armature or motor shaft 8, which is concentric with said casing, is extended upwardly therein and provided with suitable bearings 9. Rigidly attached to said shaft are arms 10, having slots 11, Fig. 2, therein into which is journaled a shaft 12 of a cylindrical weight 13 which is free to roll against the inner wall of the cylindrical shell 7, when the motor shaft is rotated. The purpose of the slots 11 is to provide for the free movement of the rolling weight without causing any lateral stress upon the motor shaft. When the shaft is driven at a high speed the weight rotating in an orbit around it which is limited by contact with the periphery of the drum or cylinder 7, serves to impart a rapid

gyrating or oscillatory movement to the suspended receptacle to which it is attached, around the axial center of said receptacle, the extent of eccentricity of which will be proportionate to the relative quantity of the mass, the gravity of the eccentric weight, the extent of its orbit and the speed at which the shaft is driven. I have found that an intense vibratory action may be imparted to a relatively heavy mass by means of a very small weight when rotated at a high speed and that the power required to produce a given result is much less in proportion when the lateral stress of the weight is removed from the motor shaft. If employed for abrading purposes such for example as the agitation of sand or other abrasive and liquid in conjunction with glass to impart a ground surface thereto, as illustrated in Fig. 1, a very rapid and uniform movement will be imparted to the abrasive material and that in a manner to impart a most pleasing effect to the surface treated.

It will be noted that the direction of rotation of the weight 13 will be opposite to that of the shaft 8, and that all the stress of its eccentric motion will be borne by the cylinder 7.

In Fig. 3 I have shown a modified form of agitator preferably recommended for use in connection with screens or sieves. In the example shown, 5 indicates an electric motor like that shown in Fig. 1, with the lead-wires omitted, and 7, the cylindrical casing above it. A short motor shaft 14, has a curved arm 15, rigidly attached thereto and extending laterally therefrom. Said arm is forked or slotted similarly to the arms 10, Fig. 2, to receive the lower end of a suspending member 16, or shaft, the upper end of which is supported in a bearing member 17, by means of a universal joint 18. The cylinder 7, which is closed at the top, is attached to a spider 19, forming a part of a main frame 20, formed for the reception and support of a removable sieve frame 21, having the usual sieve bottom 22, therein. The frame 20 is provided with a bail 23, adapted to be loosely suspended from a single support 24. A weight 25, preferably in the form of a ball or sphere, is loosely mounted upon the suspending element 16, so as to rotate thereon. The slotted arm 15, is of such a length as to permit the ball 25 to roll in a fixed orbit limited by the inner surface of the casing. I have found in practice that a highly effective agitating action may be imparted to a relatively large sieve, with a very light weight and a small motor. The sieve is caused to take a general gyratory movement of slight arc and great rapidity around a common center. This movement is illustrated diagrammatically in Fig. 5. By placing a sheet of paper 26, over the sieve 22 and laying a weight loosely thereon at the center provided with a spring pressed pencil to mark its movements and then starting the motor, the weight was found to move for an instant around a common center at 27 and then to move radially toward the periphery describing in its general course a series of loop-like oscillations, as shown at 28.

In Fig. 4 the agitator is shown as a closed self contained structure comprising the motor 5, motor-shaft 14, arm 15, suspending shaft 16, and ball 25, the whole being placed in a closed receptacle 29 in which it is suspended by means of a cord or rod 30, extended through an opening 31. Liquid placed in the receptacle will be violently agitated as a result of the vibratory action of the motor.

While I prefer to rotate the weight against a surface as described, to limit its orbit, I do not wish to be limited to a structure involving such action. A weight may be arranged substantially as shown in Fig. 6, in which the weight 32 may be free to assume a substantially horizontal position as indicated in dotted lines when driven at maximum speed. The shaft 16 then becomes the orbit limiting factor. The weight being loose upon the shaft and the latter being free to rotate upon its own axis, the two will set up a rotation in opposite directions when the speed is such as to cause the shaft to swing in a path oblique to the axis of the motor shaft. This dual rotation is also true of the frame shown in Figs. 3 and 4.

In Fig. 7, I have indicated a still further modification in which the motor shaft 8 is provided with slotted arms 10 like those shown in Fig. 2, but instead of allowing the weight 13 to roll upon the inner periphery of the casing, to limit its orbit, the shaft 33, which is loosely projected through a bore in said weight, has its ends arranged to bear against rings 34, only one of which is shown, attached to the upper and lower ends respectively of the casing. In such a construction the shaft 33 will be caused to rotate in one direction upon the inner periphery of the rings, while the weight, owing to the influence of centrifugal motion, will be caused to rotate in an opposite direction.

I have found in practice that results are greatly improved when freedom of rotation is given alike to both weight and shaft independently of each other. Neither should be restrained from following its normal tendency to rotate, and that in such a way as to relieve the motor shaft from lateral stress.

I do not wish to be limited to any specific

form of motor or construction provided satisfactory means is provided for controlling the orbit of the weight independently of the motor shaft which should have such loose or yielding connection therewith as to relieve the shaft from any lateral stress.

Having thus described my invention, I claim:

1. An agitator, comprising, in combination, a movably supported gyratory structure, a motor having a driving shaft, a weight mounted upon a support separate from the shaft, said weight being arranged to be moved in an orbit concentric with the axis of said shaft, means connected with said shaft for moving said weight in its orbit while relieving said shaft from lateral stress, and means for limiting the extent of said orbit.

2. An agitator, comprising, in combination, a suspended structure, a motor having a driving-shaft, a weight arranged to be moved in an orbit concentric with the axis of said shaft, means in connection with said shaft for actuating said weight to impart a centrifugal motion thereto, at high speed to agitate the entire structure and means independent of said shaft for controlling the orbit of said weight.

3. An agitator, comprising in combination, a movably supported gyratory structure, a motor having a driving shaft, a weight, means for freely supporting said weight in position to be moved in an orbit concentric with the axis of said shaft, means attached to and extending laterally from said shaft for imparting motion to said weight in its orbit of movement without restricting the centrifugal path of said weight and means for limiting the diameter of said orbit.

4. An agitator, comprising, in combination, a suspended structure, a motor having a driving-shaft, a weight supported for movement in an orbit concentric with the axis of said shaft, circular means concentric with the axis of said shaft for limiting the eccentric path of said weight by permitting the latter to have a rolling contact therewith and means in connection with said shaft for actuating said weight in its orbit while relieving said shaft from lateral stress.

5. An agitator, comprising in combination, a movably supported gyratory structure, a motor having a shaft, a weight suspended independently of said shaft but in axial alinement therewith, means in operative connection with said shaft for imparting centrifugal motion to said weight without restricting its eccentric path and means for controlling said path.

6. An agitator, yielding means for movably supporting the same, a motor provided with a shaft mounted in bearings in said frame, a suspended weight having its point of suspension in axial alinement with said shaft but independent thereof, means in operative connection with said shaft for imparting a centrifugal movement to said weight while avoiding lateral stress upon said shaft and means for limiting the eccentric movement of said weight.

7. The combination with a movably supported member to be agitated, of a motor having a driving-shaft, the axis of which is coincident with that of the support of said member, a weight suspended independently of said shaft, said weight having its point of suspension substantially coincident with the axis of said shaft to permit said weight to swing centrifugally, means for limiting the centrifugal movement of said weight, and means in operative connection with said motor shaft for causing said weight to freely swing with its point of suspension as an axial center.

8. An agitator, comprising, in combination, a suspended frame, a motor having a shaft, a weight independently suspended in axial alinement with said shaft, means in operative connection with said shaft for moving said weight in its orbit without restricting its eccentric path and circular limiting means concentric with the axis of said shaft to limit the orbit of said weight by a rolling contact therewith.

9. An agitator, comprising, in combination, a suspended frame, a motor having a driving-shaft, a weight, means for independently supporting said weight to be moved in an orbit concentric with the axis of said shaft, said weight being circular in cross section and mounted to rotate upon its axial support independently of its orbital movement, means for limiting said orbital movement, and means attached to said shaft for imparting motion to said weight in its orbit without restricting the extent of its eccentric movement.

10. An agitator, comprising in combination, a movably supported frame, a motor having a driving-shaft, a weight circular in cross-section, a separate supporting shaft therefor concentrically journaled therein, means for supporting said shaft while permitting it to rotate, means for limiting the orbital movement of said weight, and means connected with the driving-shaft of said motor for moving said weight in an orbit concentric with the axis of said driving-shaft without imparting lateral stress to said driving-shaft.

11. An agitator, comprising, in combination, a suspended frame, a motor having a driving-shaft, a weight circular in cross-section, a supporting shaft therefor concentrically journaled in said weight, means for supporting said shaft while permitting it to

rotate, means connected with the driving-shaft of said motor for causing the movement of said weight in an orbit concentric with the axis of said driving-shaft, and circular restricting means concentric with said axis, for positively restricting the orbit of said weight.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses, this 22d day of December, 1916.

WILLIAM LINDSAY.

Witnesses:
DAVID H. FLETCHER,
JENNIE L. FISKE.