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T. J. PUTNAM

AGITATING DEVICE

Filed Jan. 9, 1920

Fig. 1.

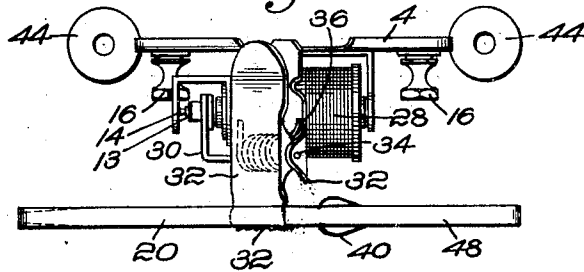


Fig. 2.

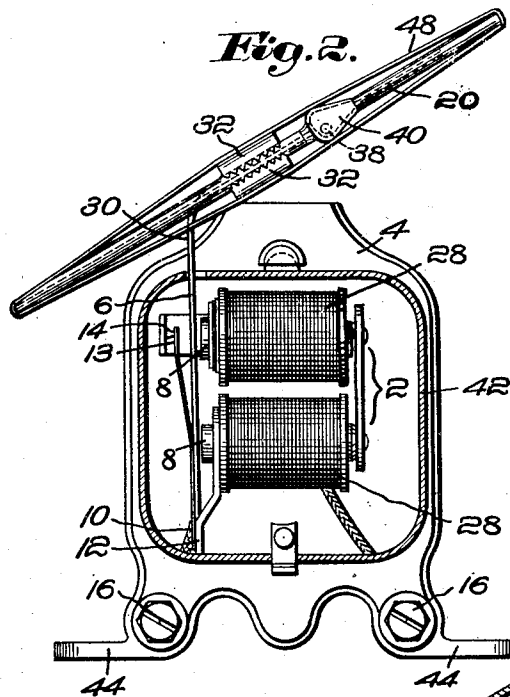
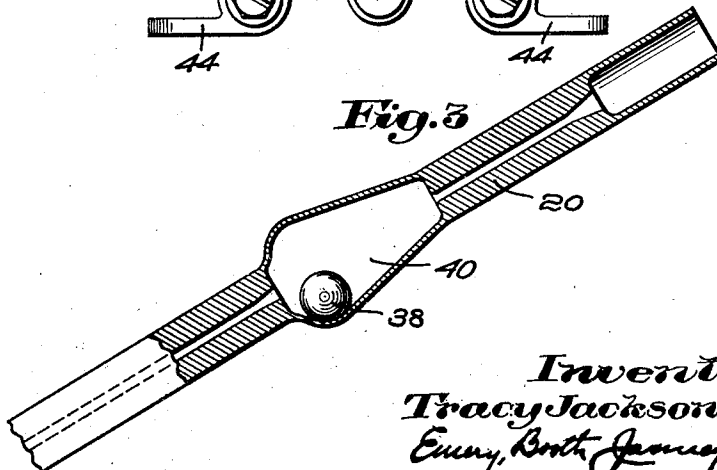


Fig. 3.



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UNITED STATES PATENT OFFICE.

TRACY JACKSON PUTNAM, OF BOSTON, MASSACHUSETTS.

AGITATING DEVICE.

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To all whom it may concern:

Be it known that I, TRACY JACKSON PUTNAM, a citizen of the United States of America, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Agitating Devices, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The present invention relates to mechanical agitators. The invention and its aims and objects will be best understood from the following description taken in connection with the accompanying drawings of one embodiment of the invention selected for purposes of illustration, it being understood that the invention in its true scope is definitely set forth by the appended claims.

In the drawings:

Fig. 1 is a top plan view of one illustrative embodiment of the invention;

Fig. 2 is a front elevation of the embodiment of the invention shown in Fig. 1, with the vibrator casing in section; and

Fig. 3 shows a portion of a hemocytometer pipette, mainly in section.

I will now describe one convenient embodiment of my invention in its application to a particular use, namely, the shaking of hemocytometer pipettes, in order to effect a uniform suspension of the blood corpuscles in the anti-coagulating or diluting fluid in which they are contained within the pipette, and thus facilitate the counting of the cells under the microscope. It is to be understood, however, that my invention is not limited to this particular use, but that it is equally applicable for shaking any relatively small vessel in order to agitate its contents for any purpose.

In carrying out my invention I provide suitable means for holding the vessel, the contents of which are to be agitated, together with means for imparting to said holder and vessel the movement necessary to agitate the contents of the latter. This latter means may be of any suitable construction and mode of operation, but I preferably use for this purpose means operable by electrical energy, such electrical means being easily operated and electrical energy being readily available.

Herein said electrical means may conveniently consist of an ordinary electrical vibrator comprising an electro-magnet 2 mounted upon a plate 4, and an armature 6 disposed in suitable relation to the cores 8, 8 of the magnet, said armature being fixedly secured in any suitable manner at one end to a metallic spring member 10 intermediate the two ends of the latter. The spring member 10 is fixedly secured in any suitable manner to a fixed metallic member 12, the free end of said spring member constituting an electrical contact 13, adapted to cooperate with a second contact 14.

Terminals 16, 16 may be connected on the one hand by a circuit containing a switch, not shown, with any suitable source of electric current, and on the other hand by wires with the vibrator apparatus described, the connections with the latter being such that when the switch is closed a current from said source of electrical energy, not shown, will pass through the coils 28, 28 of the electro-magnet and through the contacts 13, 14 thus energizing the magnet and drawing the armature toward the latter. In this operation the spring contact 13 will be removed from contact with the contact 14, thus breaking the circuit and deenergizing the magnet, so that the armature will be moved in the opposite direction by the spring 10. The contact 13 thus again contacts with the contact 14 and the circuit being thus again closed the magnets will be re-energized and will again attract the armature 6. So long as the switch is kept closed, vibratory movement will thus be imparted to the armature 6.

The vessel-holding means is herein secured to the free end of the armature 6, preferably by means of an arm 30, secured to the latter. Said holding means may be of any suitable construction. That best suited to the vessel the contents of which are to be agitated, may be used. For holding a pipette, I have found it convenient to use a clamp, rigidly secured to the free end of the arm 30. Said clamp may be of any suitable construction but herein comprises two members 32, 32 pivotally connected intermediate their two ends at 34 and having their clamping ends normally maintained closed by a coiled spring 36 coiled about the pivotal connection 34 and bearing with

its ends against the inner surfaces of the two members 32, 32 respectively, on the opposite side of the pivot 34 from that of the clamping ends of the clamping members.

5 By pressing the free ends of the clamping members together the clamping ends of said clamp may be readily opened to introduce or remove the pipette 20 from the clamp, and when said free ends are released the

10 clamp will firmly hold the pipette 20, as shown in Fig. 1.

It will be readily seen that when the circuit is closed by the switch, the vibratory movement imparted to armature will be

15 imparted to the clamp and thus to the pipette or other vessel held thereby, whereby the contents of the pipette or other vessel will be agitated.

Preferably the arrangement should be

20 such that when in position in the holder, the longer axis of the chamber in which the material to be agitated is contained shall be either at right angles to the radius of the arc of vibration leading to the

25 point where the vessel is held by the clamp or inclined to said radius, in order to secure a more thorough agitation throughout the entire mass of the contents of the vessel. Where the vessel is held at an angle

30 to the radius of the arc of vibration, the movement imparted to the vessel is peculiarly effective as it produces a circulatory motion of the liquid in the chamber. This movement resembles very closely that

35 obtained in agitating the vessel by hand. Where the device is used for mixing liquids or other materials a thorough mixture will thus be obtained. This is more particularly important where the vessel used is a hemocytometer pipette or similar vessel, wherein

40 a bead 38 or other suitable tumbling agitator body loose in the ampulla 40 of the pipette or chamber of the vessel is used to aid the operation. If the longer axis of

45 the ampulla of the pipette is not inclined to said radius or at right angles thereto, the bead 38 tends to move only around the smallest circumference of the ampulla or chamber, thus leaving the ends unstirred.

50 The magnet and armature are preferably contained within a casing 42 removably secured in any suitable manner to the plate 4 to which the magnet is firmly secured. The apparatus should be firmly held in place during

55 operation, and to this end the plate 4 may be provided with ears 44 to receive screws by which it may be securely fastened to any suitable support.

60 The arm 30 may conveniently be curved substantially as shown to render the device more compact, but this is not essential. In the operation of counting the red cells of the blood, the filled pipette should be agitated for approximately four or five minutes, a

65 length of time which few technicians are

willing to spend in shaking by hand. It will be noted that by positioning the pipette or other vessel as described, the movement imparted to the pipette or vessel by my

70 mechanical agitator is practically the same as that which would be imparted to the vessel were the operation performed by hand. This results in a uniform suspension of the corpuscles, which eliminates the

75 greatest common source of error in the whole operation, as well as facilitating the actual counting of the cells under the microscope. The saving of time and labor to the technician is also considerable.

While herein shown in its application to

80 the agitation of hemocytometer pipettes, it will be obvious that my invention is useful wherever it is desirable to produce agitation for practically any purpose. Thus it may be used for preparing bacterial suspensions,

85 in standardizing bacterines, for shaking specimens of sputa preparatory to examination, and for other similar purposes in medicine and the arts in which it is desired to prepare a suspension of fine particles in fluid

90 in a vessel by shaking, to mingle two or more fluids or to mix materials, or in short to agitate relatively small vessels for any purpose.

The vessel will preferably be closed in any

95 convenient manner during shaking. In the case of a pipette this may be conveniently done by means of a rubber band 48 extending over both open ends of the pipette, as shown in Fig. 2.

100 It will be understood that while the invention is herein described as embodied in the details illustrated, it is not to be considered as circumscribed by or limited to these details, or any of them, but that it may be variously modified within the true scope

105 of the invention which is definitely set forth by the claims.

Claims:

1. Apparatus for agitating liquids comprising, in combination, a vessel adapted to

110 hold liquids, said vessel having unequal axes, means for supporting said vessel with its long axis at an acute angle to the supporting means, and means for causing vibration of the supporting means whereby the contents of the vessel are given a circulatory

115 motion to agitate them thoroughly.

2. Apparatus to agitate liquids comprising, in combination, a vessel adapted to hold liquids and having a chamber within which

120 is a freely movable tumbling agitator element, said vessel having unequal axes, means for supporting the vessel with its long axis disposed at an acute angle to the supporting means, and means for causing vibration

125 of the supporting means whereby the agitator element is given a circulatory motion to agitate thoroughly the contents of the vessel.

3. Apparatus for agitating liquids com- 130

prising, in combination, a vessel adapted to hold liquids and having a chamber within which is a freely movable tumbling agitator element, said vessel having unequal axes, an electromagnetically vibrated armature, and means on one end of the armature for holding the vessel with its long axis disposed at an acute angle to the armature, whereby the arcuate vibrations imparted to the armature cause the agitator element to move with a circulatory motion within the chamber. 10

In testimony whereof, I have signed my name to this specification.

TRACY JACKSON PUTNAM.