

J. BOEKEL.
CENTRIFUGAL LIQUID TESTING DEVICE.
APPLICATION FILED MAY 25, 1911.

1,001,611.

Patented Aug. 29, 1911.

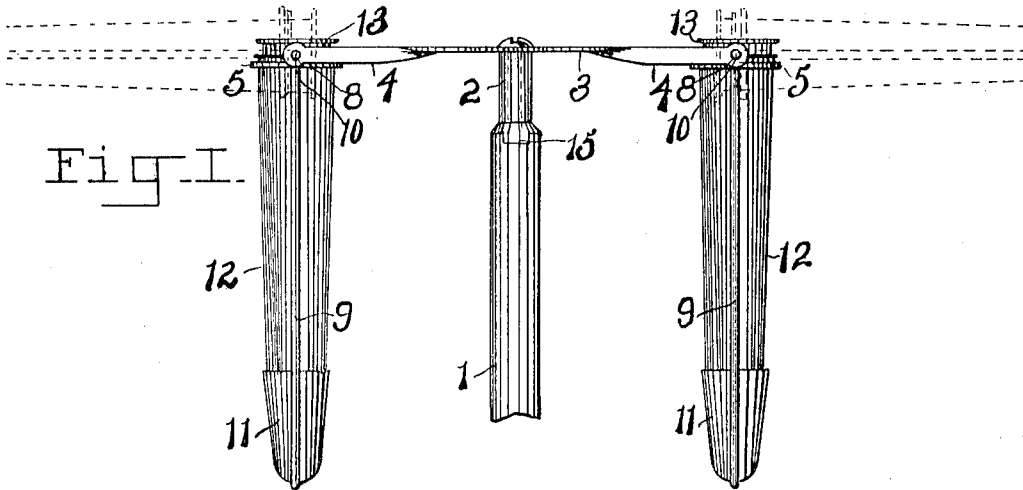


Fig. 2.

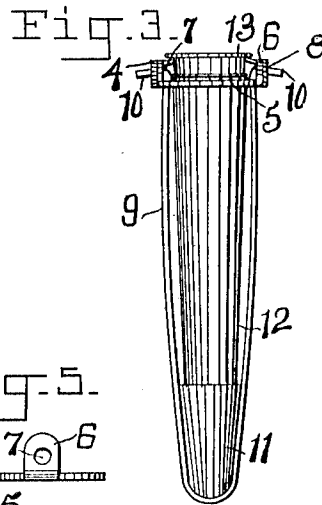
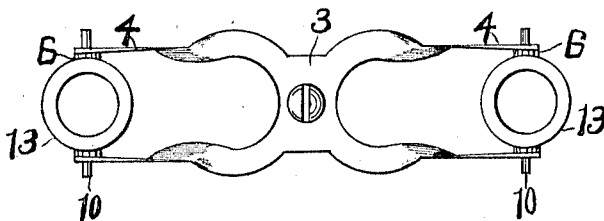


Fig. 4.

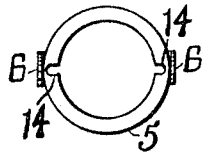
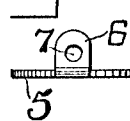


Fig. 5.



WITNESSES

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CENTRIFUGAL LIQUID-TESTING DEVICE.

1,001,611.

Specification of Letters Patent. Patented Aug. 29, 1911.

Application filed May 25, 1911. Serial No. 629,380.

To all whom it may concern:

Be it known that I, JULIUS BOEKEL, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Centrifugal Liquid-Testing Devices, of which the following is a specification.

This invention relates to centrifugal liquid testing devices provided with pivotally suspended receptacles or tubes closed at the lower or outer end.

It has been usual to set each test tube into an aluminum jacket, which, like it, has the form of a glove finger, such jacket having a rim that rests on a ring pivoted to said frame. The lower end of the jacket and that of the tube will often break under the strain of violent rotation, there being no support below or beyond the said ring.

The chief objects of this invention are first to protect the lower end or tip of the jacket and that of the test tube within it, both by supplying an exterior casing for this part and supporting the suspended jacket and tube from below instead of making the attachment at their upper ends; and secondly to facilitate the attachment and detachment of the jacket and tube, also of the ring and supporting frame.

To these ends my invention consists in the construction and combination of devices hereinafter more particularly set forth and claimed.

In the accompanying drawings: Figure 1 represents a side elevation of a liquid-testing device embodying my invention, the position of the tubes during rotation being shown in dotted lines; Fig. 2, a plan view of the same; Fig. 3, a detail elevation at right angles to Fig. 1 of the proximate half of the device; and Figs. 4 and 5, detail plan and side views of one of the rings.

Any suitable power, not shown, may drive directly or indirectly, the rotary supporting shaft 1, which fits and engages at 15 the hub 2 of a flat horizontal plate frame or spider 3, carried around therewith and having outwardly extending pairs of arms 4, which are twisted at right angles for strength as shown. A flat ring 5 is pivoted between each pair of arms and provided with a pair of raised lugs 6 having circular holes 7, which register with similar holes 8 of the proximate pair of arms 4. A depending wire frame 9 of resilient metal and long

U-shape has its upper ends 10 bent outward to pass through said holes 7 and 8, becoming the journals or pivots of said ring and frame, with bearings in the latter holes and also the means of attaching said ring and wire frame to said main horizontal frame 3. This wire frame 9 is an elongated U-shaped spring tending to expand and is separated at will from frame 3 by compressing said upper ends; also from ring 5 by a slightly greater compression. The ends 10 are inclined slightly downward from a horizontal plane as shown, to allow for the change of their angle incident to such compression of the body of the spring or wire frame 9 and thereby facilitate their withdrawal from holes 7 and 8 and their passage outward through the same in again assembling the parts, which operation is of course the reverse of that of separating them, also to increase their resistance to strain while the device is in operation.

Round wire is preferably used for frame 9 as shown; and the ends 10 at least should be of that form to turn without undue friction in the round bearing holes 8. The curved lower end of said suspension frame 9 has a thimble 11 soldered or otherwise fixed within it, which receives the lower end of the aluminum jacket 12 of the testing tube or liquid receptacle 13, both these last mentioned parts being approximately in the form of a glove finger and nested together. They are wholly supported by said thimble, though the vertical parts of the wire frame 9 more or less brace and protect the sides of said jacket. Said vertical parts near their upper ends snap out into rounded notches 14 in the inner face of the ring 5 at the middle points of the bases of lugs 6. This engagement constitutes an additional guard against the independent movement of either one of said parts 5 and 9 and also makes them brace each other. When said ring and wire frame 9 are left engaged together, although separated from the main horizontal frame 3, the upright parts of frame 9 are held in the same vertical plane. The jacket 12 extends at the top considerably above the ring for convenience in lifting the test tube out without disturbance of any other part of the mechanism. By this construction all strain on the upper end of the jacket is avoided, also the very great strain which the liquid would make on the lower end of the tube and jacket by

its centrifugal tendency during violent rotation, if there were no reinforcement of the threatened part. As the thimble 11 snugly fits the tapering lower end or tip of the said jacket, the latter and the corresponding part of the tube within it are securely braced and incased and the centrifugal strain is received by said thimble and transmitted thence to the ring 5 and flat frame 3, the tube and its jacket being merely carried as in a sling or stirrup and effectually freed from strain and danger. The ring 5 protects and braces the upper part of said jacket which it surrounds and holds said jacket and tube in axial alinement with the center of said ring whether their position be vertical, horizontal or at any intermediate angle, according to the amount of centrifugal force applied.

The general operation of the device in separating the constituents of the liquid by centrifugal action is like that of all its kind, the test-tubes or receptacles being whirled with great rapidity and flying out into the horizontal position indicated by dotted lines in Fig. 1, while the contents of each tube or receptacle automatically arrange themselves in the order of the gravity, the heavier substances being in the tip of the tube or receptacle and the lightest near its open upper end. When the rotary movement lessens the tubes gradually descend to the vertical position shown in full lines in Fig. 1 and may then be easily removed as stated. Each tube or receptacle is easily slipped out of its jacket for inspection and returned again to the same. The pivots 10 readily permit such automatic adjustment of position besides also providing means for readily attaching and detaching the means whereby the tube is suspended, said means supplying support only under its bottom. The ring 5 and the wire frame 9 may be very easily separated from each other and from frame 3 by a single slight squeezing movement of the operator's thumb and forefinger applied to the upper part of said wire frame and spring; inspected, cleaned or repaired and then as easily restored to their normal position of attachment. These devices are largely used in analyzing urine, but may equally well be applied to milk, water or any other liquid, if only physical separation of constituents by centrifugal action and in accordance with relative gravity be required. As shown there are but two tubes with the same number of jackets, rings, wire suspending frames, thimbles and pairs of arms of the main frame or spider: but of course these may be varied in number according to convenience.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination with a rotary part, a

liquid receptacle, a jacket therefor and means pivoted to said part suspending said jacket and receptacle by support applied under its bottom.

2. In combination with a rotary part, a glass test-tube with closed lower end for holding liquid, a protective jacket fitting on said tube, and means pivoted to said part exterior to said jacket suspending said jacket and tube by support applied under its bottom.

3. In combination with a rotary part, a tube or liquid receptacle and its jacket and suspending means pivoted to said part comprising a thimble which fits the lower end of said jacket in order that said jacket and tube may be supported from below.

4. Centrifugal testing mechanism adapted to support the jackets containing the liquid receptacles from the lower ends only of said jackets.

5. A rotary frame provided with a pair of arms, in combination with a ring pivoted in said arms, a liquid receptacle and jacket surrounded by said ring and a normally depending frame moving with said ring and passing down under said jacket to support the same and said receptacle from the bottom only.

6. A rotary part, in combination with a ring pivoted thereto and carried thereby, a depending frame moving with said ring and provided with a thimble or casing in its lower part, a glass tube and a jacket which fits at the lower end into said thimble and holds said tube.

7. In combination, a rotary part, a ring pivoted thereto and carried thereby, a depending frame pivoted to said part engaging said ring to move therewith and provided with a thimble at its lower end and a liquid receptacle and jacket fitted at the lower end into said thimble and surrounded by said ring.

8. A rotary frame provided with pairs of arms having bearing holes formed therein, rings fitting between said pairs of arms, depending frames provided with pivots journaled in said bearing holes and connecting said rings thereto and liquid receptacles surrounded near their upper ends by said rings and supported at their lower ends by said depending frames.

9. A rotary part having a pair of bearing holes, in combination with a ring having holes registering therewith, a depending frame having its upper ends provided with outwardly presented pivots adapted to pass through said holes of the ring and into said bearing holes, a thimble carried by the bent lower part of said depending frame and a liquid receptacle freely held in said ring and thimble and removable therefrom.

10. A rotary part having a pair of bearing holes, in combination with a ring having

holes that register therewith, a depending U-shaped wire frame having its upper ends bent outward to form pivots received in said holes of the ring and said rotary part and a liquid receptacle surrounded near its upper end by said ring and supported at its lower end by the bent part of said spring.

11. A rotary part having a pair of bearing holes, in combination with a ring having holes registering therewith, a depending frame having its upper ends provided with pivots presented outward to enter said holes but inclining slightly downward to compensate for the change of angle due to compressing the spring and a receptacle resting freely in said ring and depending frame and supported by the latter and at its lower end only.

12. A rotary part having a pair of bearing holes, in combination with a ring having holes registering therewith and a pair of notches at opposite points of its lower face, a resilient frame provided with outwardly presented pivots and a liquid receptacle suspended from under its bottom by said frame and surrounded by said ring, the resiliency of said frame serving to force its pivots into said holes and the vertical parts of said frame into said notches.

13. A rotary frame provided with pairs of arms having bearing holes, in combination with rings, each of which fits between a pair of said arms and has holes register-

ing with said bearing holes, a depending resilient U-shaped frame having at its upper ends pivots adapted to enter said holes and connect said depending frame, said ring and said rotary frame detachably together while constituting also pivots for said rings and depending frames and liquid receptacles and their jackets resting freely at their bottoms in said thimbles and freely surrounded by said rings substantially as set forth.

14. A rotary frame provided with a series of pairs of bearing holes, in combination with a series of rings, a series of depending spring frames attached respectively to said rings and pivoted in said bearing holes at their upper ends and a series of liquid receptacles carried by said depending frames surrounded by said rings and supported at their bottoms only.

15. A rotary device, in combination with means of support pivotally depending therefrom and a thimble attached to said means and adapted to fit under and around the lower end of a receptacle for supporting the same from below.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

JULIUS BOEKEL.

Witnesses:

JOHN H. SCHIERER,
WM. A. WIMER.