Feb. 13, 1940. S. S. LICHTMAN 2,189,989

TEST TUBE HOLDER

Filed Feb. 10, 1938

Fig. 1

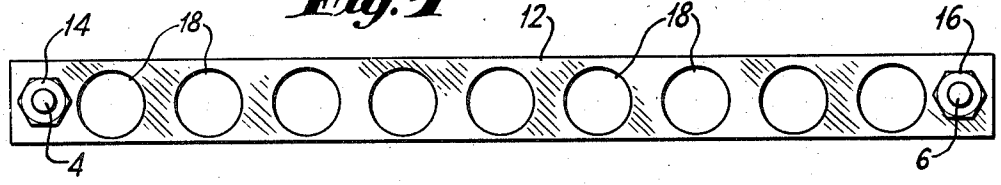


Fig. 2

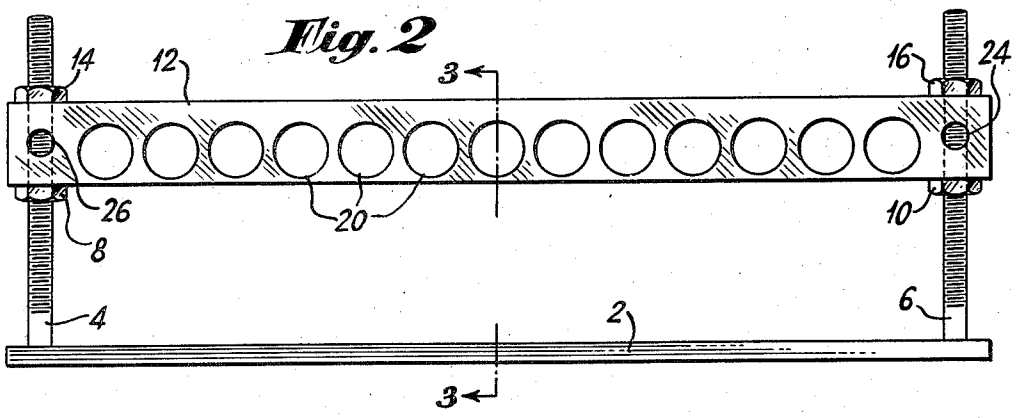


Fig. 3

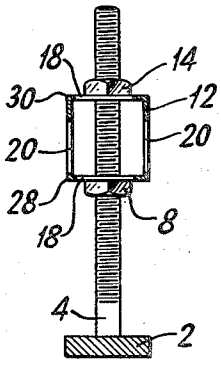


Fig. 4

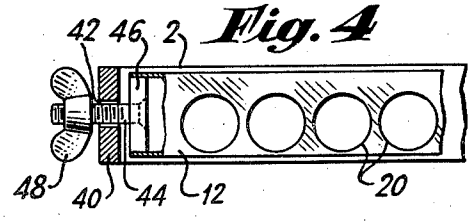


Fig. 5

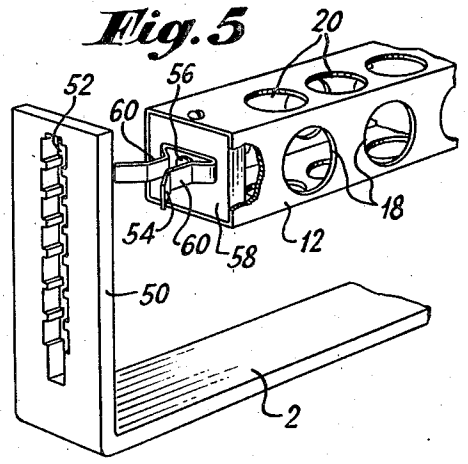


Fig. 6

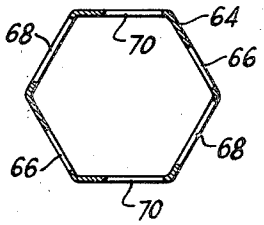
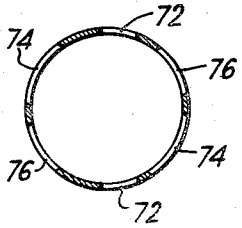


Fig. 7



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Patented Feb. 13, 1940

2,189,989

UNITED STATES PATENT OFFICE

2,189,989

TEST TUBE HOLDER

Sol Sydney Lichtman, New York, N. Y.

Application February 10, 1938, Serial No. 189,805

3 Claims. (Cl. 211—74)

My present invention relates to test tube holders.

Objects of my invention are to provide a test tube holder which will accommodate test tubes of various sizes, to provide a test tube holder which is adjustable in height, to provide a test tube holder which permits of ready view of the contents of the tubes, and to generally provide a test tube holder which is sturdy, exceedingly useful in operation and inexpensive to manufacture.

My improved test tube holder is described in some detail in my paper entitled "A sectional test tube rack" appearing in the Journal of Laboratory and Clinical Medicine, St. Louis, vol. 22, No. 2, page 204, for November 1936. Although particularly useful for enabling reading of hemolytic reactions in connection with bile salt determinations in body fluids, my invention may also be used to good advantage for the performance of agglutination precipitation, hemolysis and the Wassermann reactions. However, my invention, it is to be clearly understood, is not limited to medical use, but is also useful in other fields such as for colorimetric analyses and for many other uses.

Other objects and advantages will appear as the more detailed description of my invention follows.

Referring to the drawing, Figure 1 is a plan view of my test tube holder; Figure 2 is a side elevational view thereof; Figure 3 is a cross-sectional view of Figure 2 taken along the line 3, 3 of Figure 2; Figure 4 is a sectional view of a modification wherein by means of wing nuts and screw threaded studs, the test tube supporting member of my test tube holder may be adjustably supported with respect to the base; Figure 5 is a partial perspective view of still another modification in which spring means are used to adjustably support a member of my improved test tube holder; and Figures 6 and 7 are cross-sectional views of other shapes which the test tube supporting member of my holder may have.

Referring to Figures 1, 2 and 3, my improved test tube holder comprises a base 2 to which are fixed in any suitable way a pair of spaced screw threaded uprights 4, 6 upon which are threaded the lower supporting nuts 8, 10. Resting upon the lower supporting nuts 8, 10 and fitting, by means of suitable perforations, over the supporting rods 4, 6 is a test tube supporting member 12. This member 12 may be locked into place by means of the upper locking nuts 14, 16.

Aligned holes are drilled, punched or otherwise made in the upper and lower surfaces of the hollow member 12. Similarly, another row or series of aligned holes 20 are cut through the side faces of the hollow member 12. It will be noted that the side holes 20 are smaller than the holes 18 so as to accommodate test tubes of smaller diameter. When used for that purpose, the nuts 14, 16 are removed. The member 12 will be lifted off the rods 4, 6 and rotated 90 degrees so that the holes 24, 26 fit over the bolt studs 4, 6. The fastening nuts 14, 16 may then be replaced if desired. Preferably, the series of holes 20 are cut adjacent the edges 28, 30 so that inspection of the contents of the tubes may be facilitated.

Since the tubes are supported by the member 20 at relatively widely separated points, the entire row of tubes may be agitated without fear that the tubes will slip off the base member 2 causing breakage. Also, by adjusting the position of nuts 8, 10, 14 and 16 the point of support of the test tubes may be varied, which is frequently desired when test tubes are filled with varying amounts of material under test or observation. As shown in Figure 4, the base 2 is provided with slotted uprights 40. Only the lefthand upright has been shown in order to simplify the drawing in this case. In the slot 42 of each upright 40 rides a screw threaded stud 44, in turn fastened in a base plate 46 suitably affixed to the hollow test tube member 12. By manipulation of the wing nuts 48, the member 12 may readily be adjusted in height with respect to the base plate or platform 2. Also, rotation of the member 12 is easily accomplished by loosening the wing nuts 48, thereby permitting another row of holes to accommodate a different set of test tubes into operative position.

An exploded end view of still another modification is illustrated in Figure 5. Here again, as in Figure 4, to simplify the drawing, only the lefthand side of the test tube holder is shown, it being understood, of course, that the holder is made of any desirable length and the supporting means repeated at the righthand or far side of the holder. In Figure 5, the base 2 and upright 50 are bent out of a single piece of metal. The uprights 50 are provided with toothed slots 52 engaged by the double spring member 54. The latter is frictionally and rotatably riveted by means of rivet 56 to the end plate 58, in turn screwed or otherwise fastened to the test tube supporting member 12. The latter is illustrated similar to the member 12 of Figures 1, 2 and 3,

rotated 90 degrees, however, so that the smaller holes **20** are in operative position and the larger holes **18** lie in parallel vertical planes. Obviously, the spring clip **54** is first turned vertically so as to pass through the slot **52** and by pressing the free ends together, the member **12** may be moved vertically to a desired position, at which point the free ends of spring **54** are released so that the flat depressed surfaces **60** engage suitable teeth in the slots **52**. The row of holes **18** may be brought into service, if desired, by rotating the member **12** against the frictional action of the spring clip **54** and rivet **56**.

The member **12** may be given any polygonal shape. For example, as shown in Figure 6, it may be made in the form of a hollow metallic hexagon **64**. The opposed holes **66**, **68** and **70** are of different diameter so as to accommodate test tubes of different sizes. Also, if desired, the member **12** may be made circular in form and may be provided with opposed pairs of opening **72**, **74** and **76**. All parts of the test tube holder may be made of any desired material, but preferably the entire holder is made of non-corrosible metal so that a whole series of tubes may, if desired, be immersed in liquids without ill effects.

My invention is particularly useful in the fields mentioned since it permits direct view of a row of test tubes. Also within the purview of my invention, as explained in my paper referred to a number of my test tube holders may be mounted upon a common rack and a complete row or section or, in other words, a complete line of test tubes, may be removed by means of my improved test tube holder for simultaneous inspection and comparison.

It is to be noted that offsetting of the holes in the tube supporting member permits one to hold an entire row of test tubes against the frosted glass surface of an illuminating box for precise differentiation in such matters as partial and complete hemolysis.

In the modification shown in Figure 4, the end plates **46** may be provided with a hole internally threaded, in which case the stud **44** would be replaced by a suitable cooperating bolt.

As a further modification, the member **12**, as well as the base **2**, may be made of telescoping members. In this way, the entire length of the holder may be varied. Suitable set screws in the telescoping members will permit fixed adjustment as to length.

It is to be noted that in Figure 4, for the sake of clarity, the end plate **46** is shown spaced away for a relatively large distance from the upright **40**. In practice, this spacing should be made small so that upon tightening the wing nut **48**, the base plate **46** and uprights **40** will come into frictional contact. The slots in the uprights **40** extend entirely through one end of the same so that the member **12** with its fixed studs **44** may be lowered to a desired position along the supporting uprights **40**.

Other changes may, of course, be made without departing from the scope of my invention.

Having thus described my invention, what I claim is:

1. A test tube holder comprising a hollow member, a series of aligned holes corresponding in diameter to test tubes of one size to be supported, the holes being made through said hollow member, another series of aligned holes of another size for another series of test tubes made through said member, both said series of holes having their axes at an angle with respect to one another, a base, uprights attached to said base, and means for causing said uprights to support said member in spaced relationship with respect to said base, said means being in the form of screw threaded elements.

2. A test tube holder comprising a member, a series of aligned holes corresponding in diameter to test tubes of one size to be supported, the holes being made through said member, another series of aligned holes of another size for another series of test tubes made through said member, both said series of holes having their axes at an angle with respect to one another, a base, uprights attached to said base, and means for causing said uprights to support said member in spaced relationship with respect to said base, said means being in the form of screw threaded elements.

3. A test tube holder comprising a member, a series of aligned holes corresponding in diameter to test tubes of one size to be supported, the holes being made through said member, another series of aligned holes of another size for another series of test tubes made through said member, both said series of holes having their axes at an angle with respect to one another, a base, uprights attached to said base, and means for causing said uprights to support said member in spaced relationship with respect to said base.

SOL SYDNEY LICHTMAN.