T. LIDBERG.

INCUBATOR FOR MICROSCOPE STAGES.

APPLICATION FILED JUNE 24, 1914.

1,144 942. Patented June 29, 1915.

Fig. 1.

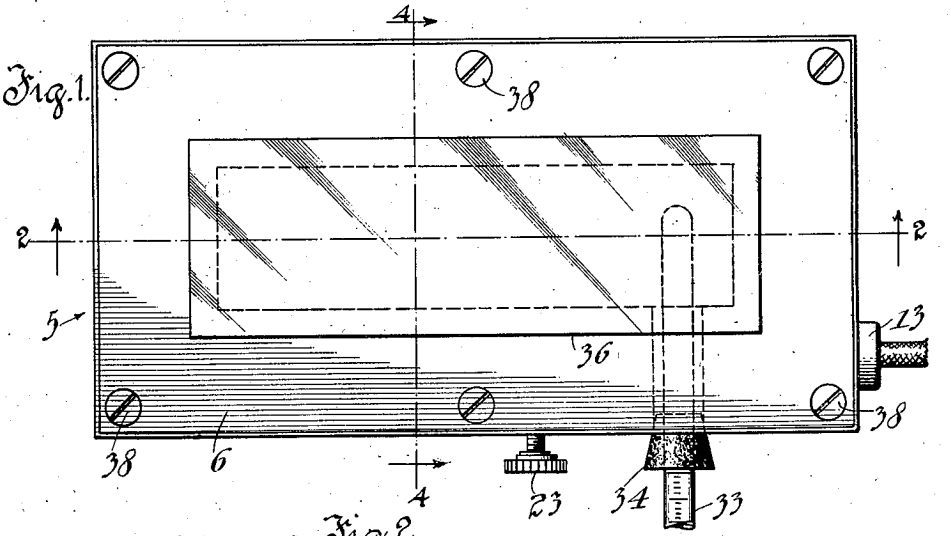


Fig. 2.

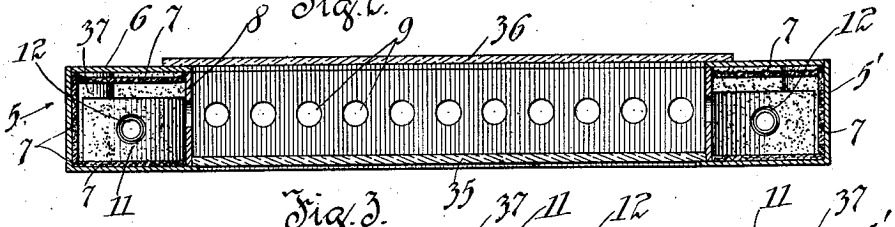


Fig. 3.

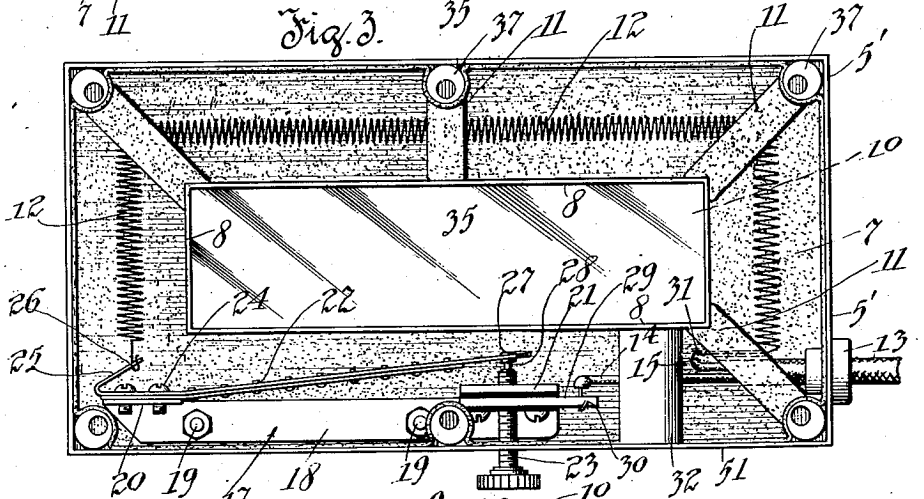
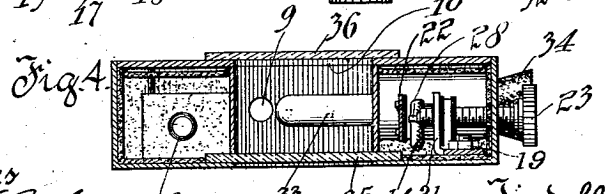


Fig. 4.



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UNITED STATES PATENT OFFICE.

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INCUBATOR FOR MICROSCOPE-STAGES.

1,144,942. Specification of Letters Patent. Patented June 29, 1915.

Application filed June 24, 1914. Serial No. 846,941.

To all whom it may concern:

Be it known that I, TIODOLF LIDBERG, 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 Incubators for Microscope-Stages, of which the following is a specification.

My invention relates to improvements in bacteriological incubators, which are especially adapted for use with microscopes.

One of the objects of my invention is to provide an incubator for the preservation and propagation of bacterial organisms.

Another object of my invention is to provide an incubator of this character, which is especially adapted for use with a microscope, whereby the process of reproduction may conveniently be observed. And still another object of my invention is to generally improve devices of this character.

Other and further objects of my invention will become readily apparent to persons skilled in the art from a consideration of the following description when taken in conjunction with the drawings forming a part hereof, wherein—

Figure 1 is a plan view of the device. Fig. 2 is a longitudinal central section, taken on line 2—2 of Fig. 1. Fig. 3 is a plan view with the top removed. Fig. 4 is a transverse, sectional view taken on line 4—4 of Fig. 1.

In all the views the same reference characters are employed to indicate similar parts. For convenience of use in application to a typical microscope my incubator in the illustrated exemplification, consists essentially of a box, quadrangular in shape, and in the form of a hollow rectangle surrounding a court. The box 5 is preferably formed of sheet metal and is provided with a removable top 6. The encompassing hollow walls are lined upon three sides, the bottom, outer and top, with a heat insulating lining, such as sheets of asbestos 7, and the interior vertical wall 8 is perforated at intervals, as at 9, so as to provide openings into the inner court space 10. At suitable intervals blocks of asbestos, or other similar refractory heat insulating material 11, are placed within the heating space, inclosed by the inner and outer walls, for support of the electric-conducting heating wire 12. The heating wire 12 is coiled into a continuous series of convolutions and is supported by the perforated blocks 11. An insulating bushing 13, passes through the outer wall 5′ of the box and is a means for supporting the electric conductors 14 and 15. The heat-responsive current-controlling thermostat 17, is placed within the quadrangular box, or elsewhere, within the influence of the heat produced and consists of a base plate 18 secured to the bottom of the structure, as by screws and nuts 19. Portions 20 and 21 at each end are turned up for support of the thermostatic bar 22 and the contact screw 23. A thermostatic bar 22 is secured to the end 20 of the plate 18 by screws 24 and the tail end of the bar 25 is connected to the heating wires 12, as at 26. The bar is provided on its free end with a contact 27 which is adapted to coöperate with a contact 28 of the adjusting screw 23. The adjusting screw is insulatedly secured to the projecting part 21, of the plate 18, and is threaded in a plate 29, and projects outside of the quadrangular box for convenient adjustment. A wire 14 is connected to the plate 29, as at 30, and the wire 15 is connected to the heating wire 12, as at 31. An open ended cylinder 32 is passed through openings in the outside wall 5′ and the inside wall 8, and provides a passage way for insertion of a thermometer 33 into the inner court 10. A cork 34, surrounds the thermometer tube 33 and insulatedly supports the thermometer within the open ended cylinder 32 and prevents escape of heat from the inner court. The thermometer is thus placed before the operator and readily indicates the temperature within the inner court. The predetermined temperature within the inner court, may be maintained constant, within a very small fraction of a degree by the expansion bar, and the variation of temperature may be effected by adjustment of the screws 23, with reference to the expansion bar 22. A glass plate 35 is fixed in the bottom of the inner court and serves as a closure. A glass plate closure 36, somewhat larger than the dimensions of the inner court may be loosely placed over the upper opening thereof. This is the plate upon which the bacteria to be propagated and observed is deposited, or two such plates may be employed if desired and the specimens may be included between such plates. Screw threaded posts 37 are placed at in-

tervals within the box and secured to the outer walls 5′ for reception of screws 38 that are employed to hold the top 6 in place.

The operation of the device is as follows: The conducting wires 14 and 15 are connected to the proper source of electric current supply when the circuit will be completed from wire 15 through the heating element 12 to the expansion bar 22 and through the contacts 27 and 28 and screw 23 to the plate 29, thence to the wire 14, thus completing the electric circuit through the device and heating the wire 12 until the heat produced within the quadrangular space, included between the side walls 5′ and 8, causes the expansion bar 22 to leave its electrical connection with the contact 28 and thus open the circuit. The air heated by the wire 12, within the rectangular space, will pass through the openings 9 into the inner court 10 which is immediately below the plate 36 upon which the specimens are deposited, and thereby the plate 36 and the specimens thereon will be warmed to the desired temperature. Should the temperature within the space described increase to the slightest extent, beyond a predetermined value, the expansion bar 22 will open the electric circuit and should the temperature tend to drop it will again make electrical connection with the contact 28 and the circuit will be closed, whereupon the conductor 12 will again supply heat to raise the temperature within the inner court. A screw 23 may be rotated for the purpose of adjusting the device to vary the predetermined temperature to be maintained so that the temperature within the selected area will not vary more than a fraction of a degree, from that to which the device is adjusted.

The device may be bodily moved, with reference to the lens of the microscope or taken from the instrument, without disturbing the connections or interfering with the operation.

The heat insulated lining of the outer walls prevent sudden chilling of the inclosed space and thereby contributes to the maintenance of constant temperature within the selected area or court and adds to the efficiency of the operation.

While I have herein shown a single embodiment of my invention, for the purpose of clear disclosure, it is manifest that variations in the construction and disposition of the parts may be made, within the scope of the appended claims, and within the spirit of my invention.

Having described my invention, what I claim is:—

1. A device of the character described comprising a double wall structure, the inner wall being perforated, providing an inclosed heating space surrounding a court to be heated; substantially transparent closures for said court; an electric heating element, within said heating space; and heat responsive means for controlling the circuit including said element, to maintain constant the temperature of the atmosphere within said court.

2. A device of the character described comprising a double wall structure, the inner wall being perforated, providing an inclosed heating space surrounding a court to be heated; suitable transparent closures for said court; an electric heating element within said heating space; an adjustable heat-responsive means within said heating space for controlling the circuit including said element to maintain constant the temperature of the atmosphere within said court and means accessible from without the outer wall to adjust said heat responsive means.

3. A device of the character described comprising a double wall quadrangular box, the inner wall being perforated, providing an inclosed heating space surrounding a court to be heated; substantially transparent closures for said court, one of which is removable; an electric heating element, insulatedly supported within said heating space; an adjustable heat-responsive thermostat for controlling the circuit including said element to maintain constant the temperature of the atmosphere within the court, and an adjustable screw projecting outside of the box to adjust the thermostat for predetermined temperature.

In testimony whereof I hereunto set my hand in the presence of two subscribing witnesses.

TIODOLF LIDBERG.

In the presence of—
STANLEY W. COOK,
MARY F. ALLEN.