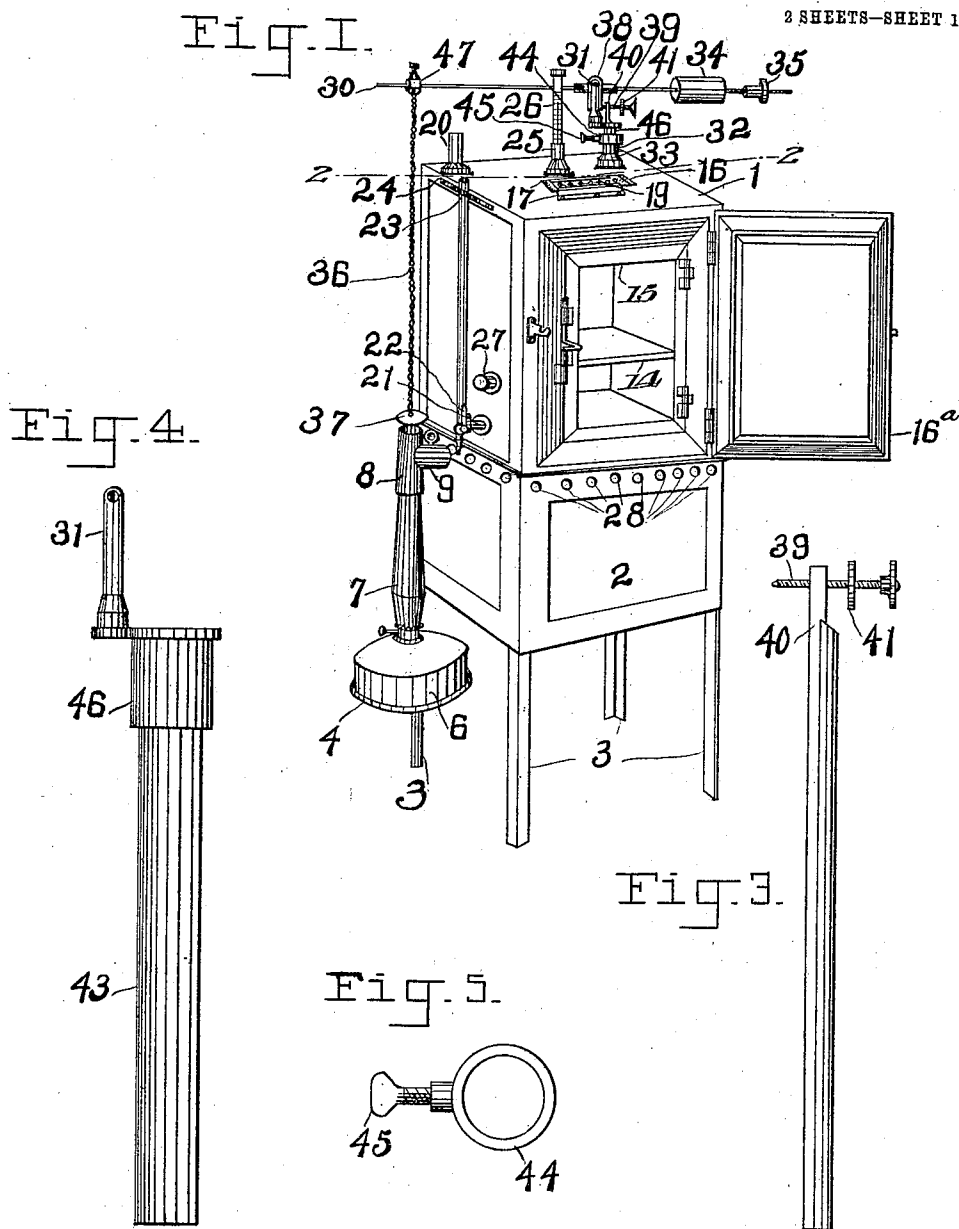


J. BOEKEL.
THERMOSTATIC DRAFT REGULATOR FOR INCUBATORS OR OTHER PURPOSES.
APPLICATION FILED JUNE 1, 1911.

1,016,126.

Patented Jan. 30, 1912.

2 SHEETS—SHEET 1.



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Fig 2.

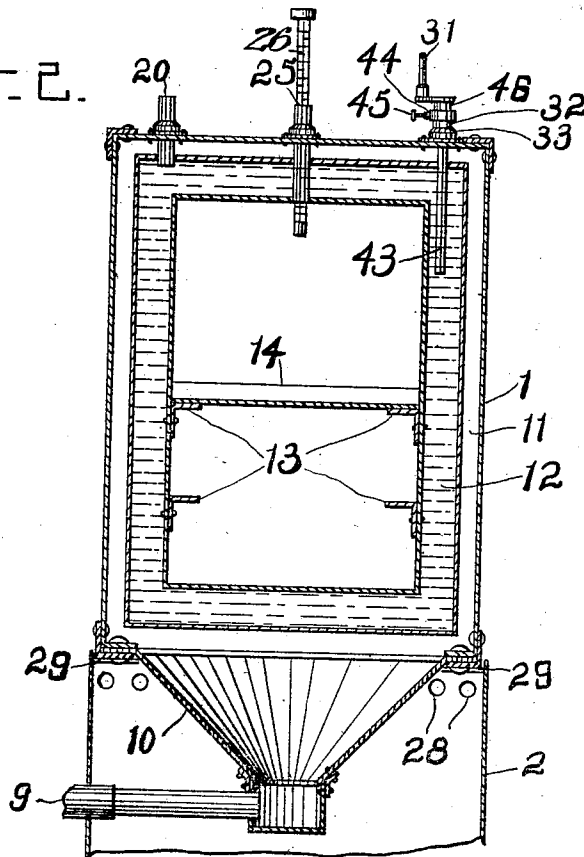


Fig. 6.

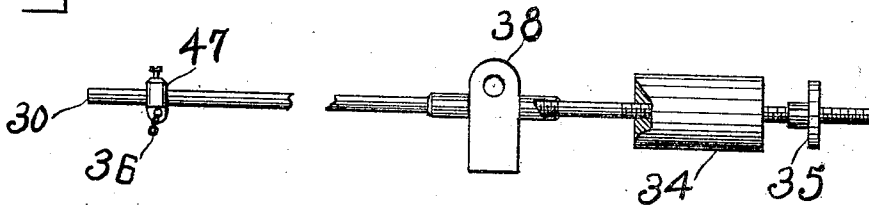
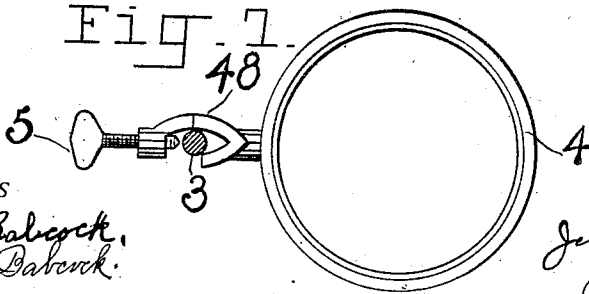


Fig. 7



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UNITED STATES PATENT OFFICE.

JULIUS BOEKEL, OF PHILADELPHIA, PENNSYLVANIA.

THERMOSTATIC DRAFT-REGULATOR FOR INCUBATORS OR OTHER PURPOSES.

1,016,126.

Specification of Letters Patent.

Patented Jan. 30, 1912.

Application filed June 1, 1911. Serial No. 630,574.

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 Thermostatic Draft-Regulators for Incubators or other Purposes, of which the following is a specification.

10 The chief object of this invention is to provide means for automatically regulating the supply of heated air to an incubator for developing germ-cultures by means of a thermostatic bar and a counterbalanced
15 draft-regulating lever actuated by the expansion of said bar. It is however available for many other purposes and in many other situations where thermostatic regulation is desired.

20 In the accompanying drawings: Figure 1 represents a perspective exterior view of a culture incubator provided with appliances embodying my invention; Fig. 2, a vertical
25 section of the same on line 2—2 of Fig. 1, the lower part of the lower casing being broken away and the lever and attached parts being omitted in the interest of simplicity; Fig. 3 represents an enlarged detail
30 elevation of the thermostatic bar and its adjusting screw; Fig. 4, a similar view of the casing therefor and attached parts; Fig. 5, an enlarged plan view of the collar
35 44 and screw 45 hereinafter described; Fig. 6, a detail view in side elevation of lever 30, broken away in the middle and parts
40 mounted thereon; and Fig. 7 represents a similar view of bracket 4, for holding the heater, and certain cooperating parts, the latter, except leg 3, being necessarily hidden

45 in the view shown by Fig. 1. The incubator as a whole consists of an upper casing 1, a lower casing 2 supported on legs 3, and means for supplying and regulating a current of heated air applied

50 One of the legs 3 has a metallic ring or bracket 4 clamped thereon by a screw 5 or its equivalent passing through a screw tapped jaw 48, said ring being adjustable as to height. This ring or bracket receives and supports a lamp or heater 6 having a metallic chimney 7 in the form of two conoids placed base to base, its upper end
55 connecting with a cylindrical outlet flue 8, having a side passage 9, through which the products of combustion pass to a conical

downward expansion chamber 10 of an air space 11, which extends all around the upper casing 1 and over the top and bottom thereof within the exterior shell of said casing. Next within this air space is a water space 12 of like form, which moderates and preserves the heat of said air-space tending to prevent sudden changes. Within the inner shell of this water space
65 is the culture chamber provided with flanges 13 for supporting one or more shelves 14 on which the cultures may be supported. The front of this is closed by a door and there is a second and larger door 16^a outside of the latter.

At the top of casing 1 and air space 11 there is a damper consisting of a slide 16 working in guides 17 over a longitudinal series of holes 18 in the upper shell, said
75 slide being also provided with a longitudinal series of holes 19 and the relative arrangement of these two series of holes being such that at least one outlet opening from said air-space is always provided, the number of open holes and the degree to which they are opened being regulated at will by the adjustment of said slide. By these devices controlling the inlet and outlet the heating may be manually regulated.

85 The water space 12 is provided with an inlet tube 20 extending up through the top of upper casing 1 also with a lateral water gage pipe 21 in the lower part of said casing, governed by a cock 22 and connected
90 with and supporting a vertical glass water gage, held in vertical position exterior to said casing but parallel to its side by a fixed collar 23 of a small bracket 24 fastened to the side of said casing 1 near its
95 top. A tube 25 passes down through the air space and water space to the culture chamber, permitting the suspension of a thermometer 26 therein. A lateral tube 27 similarly extends through said spaces to the
100 lower part of said culture chamber, permitting the escape of foul air or allowing fresh air to flow in as needed. This opening is ordinarily plugged as shown, but opened when the air should pass either way. The
105 lower casing 2 has ventilating openings 28 in its sides to admit cool air and prevent the bottom shell of casing 1 and pipe 9 from being overheated. It is also provided with interior flanges 29 for supporting said
110 upper casing 1.

The mechanism for automatic draft regu-

lation is as follows. A long lever 30 is pivoted in a bifurcated standard 31 mounted on a long tube or cylindrical casing 43 vertically adjustable in a short thin collar 32 fast on a thin tubular pedestal 33 fixed on the top of the casing 1. The short arm of said lever is provided with a screw-threaded counterbalance weight 34, adjustable along a screw-threaded part of said arm and held by a nut 35 against entire separation. From the long arm of said lever by a chain 36 a valve-disk or damper 37 is suspended above the top of the vertical outlet flue 8 of the heater, being attached by a clamping collar 47, adjustable along said arm to vary leverage. When this disk 37 rests on and closes the said top the entire current of heated air and products of combustion from the heater will pass into the air space 11; but if the disk 37 be raised more or less, a greater or less part of this heating current will be diverted into the surrounding air, reducing proportionally the heating action of the incubator. By adjusting the weight 34 until the disk rests very lightly on top of the outlet flue 8, its action may be made very delicate and responsive, so that a very slight impulse will tilt the lever and lift the disk. On the under side of lever 30 a rigid lug, plate or finger 38 extends downward between the bifurcations of standard 31 before mentioned, being in proximity to the tip of an approximately horizontal screw 39, which is adjustable through the upper end of a compound thermostatic bar 40, consisting of two strips of metal fastened together and having different degrees of expansibility under the action of heat. One of these strips is preferably of steel, the other, in which it is embedded, of some composition differing so widely in such expansibility that the effect of heat is to bend the bar as a whole, forcing the tip of screw 39 against lug 38 and tilting the lever 30 to lift the valve disk 37. By adjusting said screw in one direction or the other through the screw-tapped upper end of said thermostatic bar 40 the amount of its bending and of the heat applied to it necessary to effect such automatic draft regulation may be determined at will. A nut 41 on said screw keeps it exactly in the desired position of adjustment. The compound bar 41 is within the long casing 43 aforesaid, except as to its upper end which extends considerably above the same. This casing is located in one of the vertical parts of the water space 42, and is enlarged at its upper end as shown at 46 to fit rather closely the tubular pedestal 33, though normally movable up or down therein. A collar 44 surrounds said pedestal and may be slipped up or down thereon. A clamping screw 45 working through said collar may be turned at will against said pedestal, so as to force the thin material

thereof against the enlarged upper part 46 of the said tube or casing 43, so that the friction between these tubular parts will be sufficiently increased at this point to hold the casing 43 as adjusted to any height. Such adjustment of course raises or lowers the lever and all parts attached thereto as well as screw 39 and the thermostatic bar 40. By the various adjustments stated all variations may be compensated for and the various parts of the device kept in the best condition and position for their work; and the automatic cooling action may be arranged to take place at any predetermined degree of heat. When the water in the water space 12 is heated beyond the point thus chosen by the products of combustion in the air space 11, the bar 40 is sufficiently heated thereby, both directly at its lower end and by conduction through its casing 43 at all points of its length within the same to bend far enough to act on and tilt the lever and raise the disk as aforesaid.

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

1. In a draft regulator for culture incubators and other apparatus, an upright thermostatic bar adapted to bend laterally under the influence of heat and arranged partly within the incubator, but extending through and above the top of the same, a heater for said incubator, a valve governing the draft thereof, a lever provided with means connecting it to said valve, a part depending from said lever and a horizontally adjustable part carried by the protruding upper end of said thermostatic bar approximately at right angles to the latter and arranged in proximity to said depending part, in order that the lateral bending of the upper end of said bar under the influence of heat may press the end of said adjustable part against said depending part and thus tilt the latter to regulate the draft.

2. In a regulator for culture incubators and other apparatus, an upright thermostatic bar adapted to bend laterally under the influence of heat and arranged mainly within the incubator, but protruding through the top thereof, an approximately horizontal device attached to the upper end of said bar, a heater for said incubator, a draft-regulating lever for the said heater, having a rigid lug extending downward in front of said horizontal device, in order that the lateral bending of the upper end of said device in that direction may force the said device horizontally against the said lug and thereby tilt the said lever to regulate the draft substantially as set forth.

3. In a regulator for culture incubators and other apparatus, an upright thermostatic bar adapted to bend laterally under the influence of heat and protruding at its

upper end through the top of the incubator,
a horizontal screw adjustable through the
top of said bar, a heater and a lever pro-
vided with draft regulating means and with
5 a rigid lug arranged to be struck by said
screw for tilting said lever as the upper end
of said thermostatic bar bends laterally to-
ward it substantially as set forth.

In testimony whereof, I have signed my
name to this specification in the presence 10
of two subscribing witnesses.

JULIUS BOEKEL.

Witnesses:

JOHN H. SCHERER,
WEL. A. WIMER.