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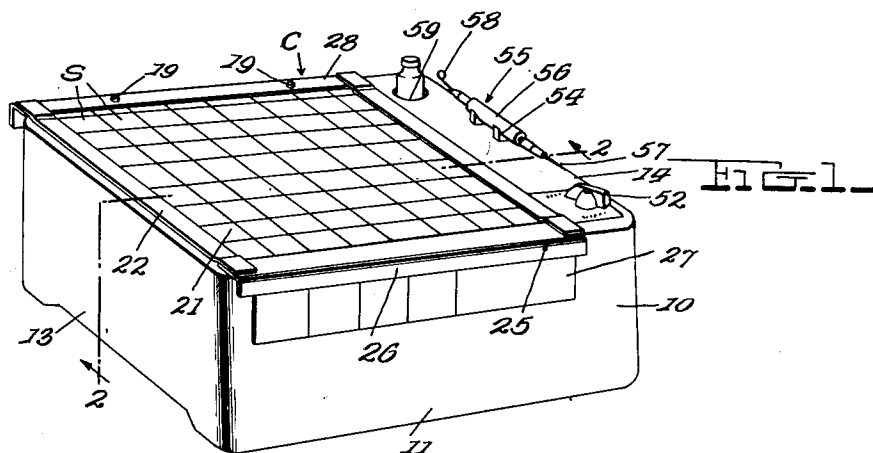
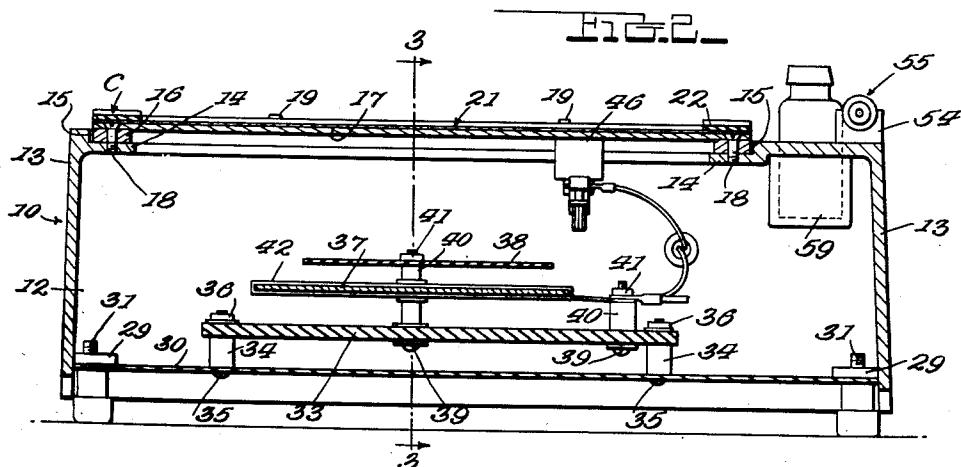
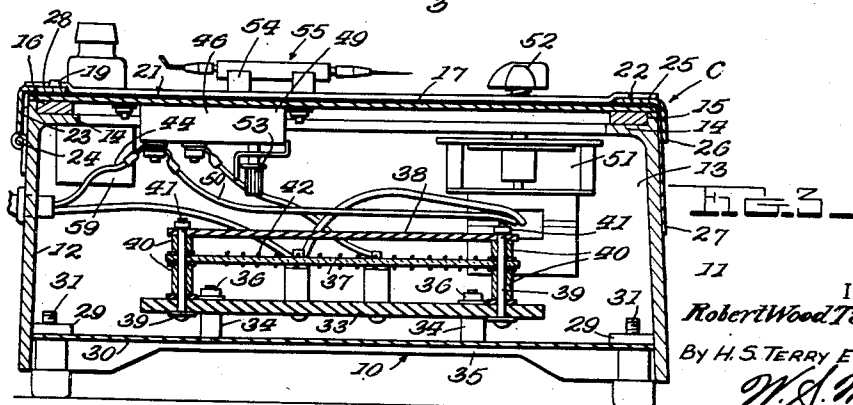
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2,634,359

ELECTRICALLY HEATED DEVICE FOR ANTIGEN TESTS

Filed June 14, 1950

2 SHEETS—SHEET 1



INVENTOR.
Robert Wood Terry, DECEASED

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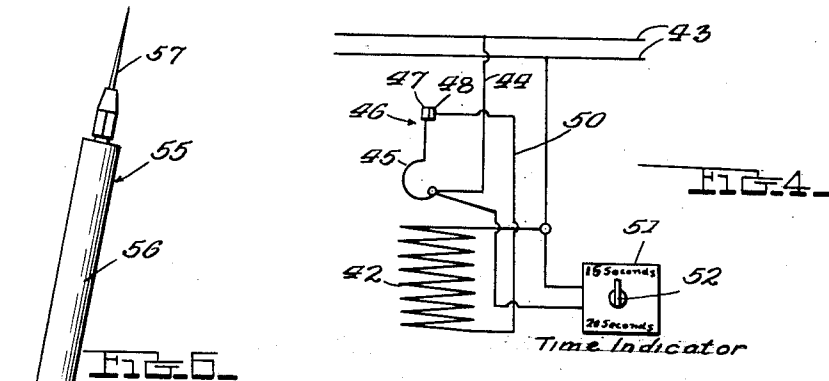
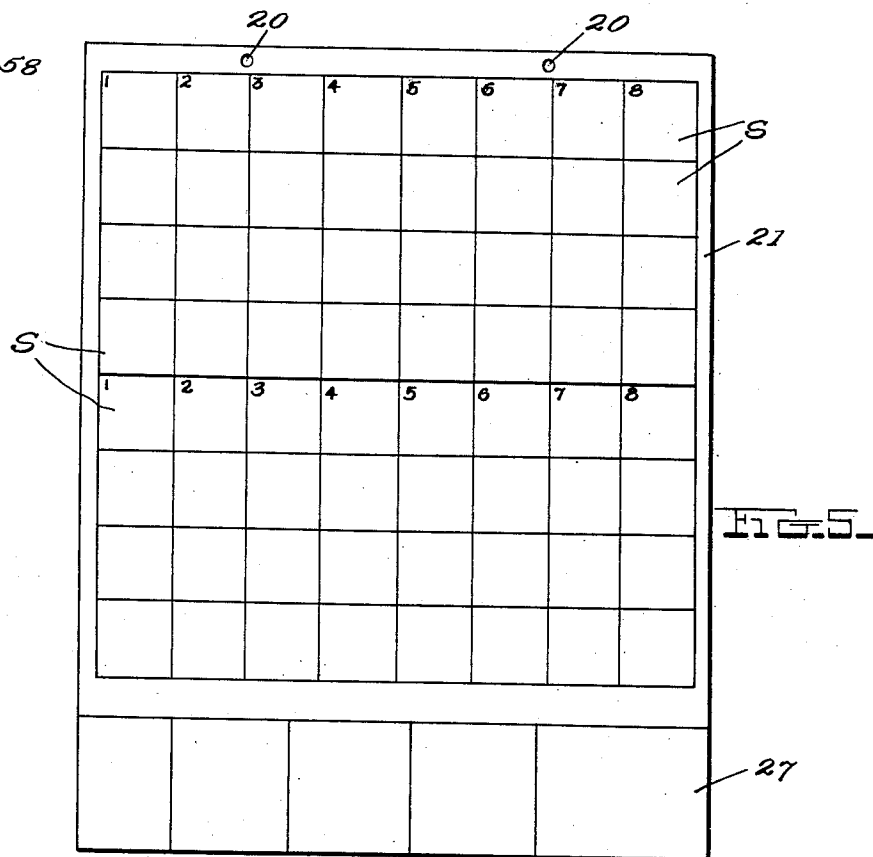
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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE

2,634,359

ELECTRICALLY HEATED DEVICE FOR
ANTIGEN TESTSRobert Wood Terry, deceased, late of Columbus,
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Application June 14, 1950, Serial No. 167,944

5 Claims. (Cl. 219—19)

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This invention relates to an improved appliance for heating test-conducting surfaces, and has particular reference to a portable electrically heated machine for facilitating the making of blood and serum tests employed in biological determinations. In its more specific aspects, the present invention provides an electrically heated cabinet for the reception of paper, or other thin sheet materials, containing test blanks for conducting and recording antigen tests of the type employed by hatcherymen for the determination of pullorum disease in poultry, although the apparatus is applicable to the making of contagious abortion tests in cattle, and in other capacities where blood or serum undergoing tests is deposited on sheets or testing surfaces and admixed with an antigen to disclose biological characteristics.

Antigen tests on fowls have been carried out heretofore by employing plates or dishes, sometimes referred to as mirrors. On these plates or mirrors, the blood of each fowl tested is separately mixed with antigen and reactions visually noted to determine the presence of certain agglutinations. A more current practice is to employ paper testing sheets of the type set forth in Patent No. 2,194,131, granted March 19, 1940, whereby antigen tests are made directly on appropriate sheets of paper, or other correspondingly relatively inexpensive material, so that said sheets, following the making of the tests thereon, may be employed as an enduring or permanent record of the tests.

The present invention is particularly useful in carrying out tests on paper sheets or other similar surfaces. It has been found that better control of the reaction conditions is obtainable when such sheets are at a somewhat elevated temperature, such, for example, as a temperature varying between 109° and 97° F. As a practical matter, these tests are often conducted out-of-doors or in unheated sheds or poultry houses, when wide temperature ranges exist, from the extreme cold of winter to the heat of summer. Such temperature variations affect the reaction conditions present when making antigen tests of the character under consideration, often giving rise to false determinations of the tests.

It is, therefore, an object of the present invention to provide a cabinet or table on which such paper sheets may be placed to admit of biological determinations of reactants deposited on the sheets, and wherein provision is made in the construction of the cabinet to produce a uniform heating of test sheets flatly deposited thereon,

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whereby to render reaction conditions from a temperature standpoint, and also from a standpoint of time, relatively uniform for all practical purposes.

It is another object of the invention to provide an apparatus of this kind containing means for holding removably a paper test sheet in a stationary flat condition on a table surface while tests are being made and to use controlled electrically actuated means for heating said table surface and a paper test sheet contained thereon to desired temperatures.

It is another object of the invention to provide apparatus of this kind which is simple in construction, fast and convenient to use and which may be heated by electrical energy obtained from standard commercial circuits.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same:

Fig. 1 is a perspective view of an electrically heated biological test-conducting cabinet formed in accordance with the present invention;

Fig. 2 is a vertical longitudinal sectional view taken through the cabinet on the plane indicated by the line 2—2 of Fig. 1;

Fig. 3 is a vertical transverse sectional view taken through the cabinet at right angles to the plane of the section of Fig. 2, as indicated by the line 3—3 of Fig. 2;

Fig. 4 is a diagrammatic view of the circuit employed in connection with the electrical resistor heating element of the cabinet;

Fig. 5 is a plan view of one of the paper test sheets used in connection with the cabinet;

Fig. 6 is a perspective view of a blood-gathering loop instrument employed in depositing blood or serum on the test sheet of the apparatus.

Referring more particularly to the drawings, the improved heating cabinet C constituting the present invention embodies a casing 10 which may be in the form of a rectangular or cubical casting formed from a lightweight metal alloy, such as an alloy of aluminum or magnesium, the casting embodying a substantially vertical front wall 11, back wall 12, side walls 13, and an open top and bottom. At its top, the casing 10 includes inwardly directed substantially horizontally disposed flanges 14, the latter being recessed as at 15 along their inner and upper surfaces to receive the frame 16 of a horizontally disposed table member 17, which closes the open

top of the casing frame 10. This table member is preferably formed of a heat-conducting material such as aluminum or an alloy thereof. Screws 18 may be used in uniting the table member and its frame 16 to the recessed portions of the frame flanges 14, so that the table member may be stationarily positioned in connection with the cabinet.

Arising from the table member contiguous to the rear edge of the cabinet are spaced upstanding studs 19 which are adapted to pass through openings 20 provided in a paper test sheet 21. This sheet is held in a flat, taut and stationary condition on the upper surface of the table member 17 by a hingedly movable positioning frame 22. This frame at the rear thereof includes a downturned flange 23 which is joined with the movable leaves of hinges 24 mounted on the back wall 12 of the casing frame. The positioning frame 22 is of approximately the same width as the paper test sheet, and at its forward end, the frame 22 is provided with an angular bar 25, the vertical leg 26 of which, when the frame 22 is lowered, covers and protects the depending portion 27 of the test sheet which depending portion is present as a result of the increased length of the test sheet with reference to the width of the table member when measured from the front to the back of the cabinet. The rear angle bar 28 of the frame 22 is formed with openings through which the studs 19 project when the positioning frame is lowered to occupy the positions disclosed in Figs. 1 to 3.

Integrally formed with the frame 13 and projecting inwardly and horizontally from the lower portions of the walls 11, 12 and 12 thereof are lugs 29 having flat under surfaces. Held against these under surfaces in a secure but removable manner is a bottom panel 30 which is retained in position by threaded base posts 31, the upper ends of the latter being provided with reduced threaded shanks which are threaded into openings provided in the lugs 29.

Supported on the top of the panel 30 within the confines of the frame 10 is an insulating panel 32, the latter being arranged on thimbles 34 through which the shanks of bolts 35 extend, the threaded upper ends of the latter receiving nuts 36, holding the insulating panel in secure but spaced relation on and from the bottom member 30.

Arranged above the insulating panel 33 is a resistor panel 37 and above the resistor panel a heat-deflecting sheet metal plate 38, the panel 37 and plate 38 being held in connection with the insulating base panel 33 by means of headed bolts 39, symmetrical spacers 40 and binding nuts 41, as best shown in Fig. 3. Wrapped around the resistor panel 37 are the coils of an electrical resistance unit 42, the operation of which is controlled by apparatus which can be best understood by reference to the wiring diagram depicted in Fig. 4. In this latter figure, current supplying conductors are indicated at 43. From one of these conductors, a lead-in wire 44 extends to the bimetallic switch arm 45 of a temperature-controlling thermostat 46. The free end of the switch arm, which carries a contact 47, is movable in response to temperature fluctuations toward and away from a fixed contact 48 mounted stationarily in the casing 49 of the thermostat. From the contact 48, a conductor 50 leads to a coil of the resistance unit 42. With the contacts 47 and 48 disposed in engagement, as in Fig. 4, current flows from one of the conductors 43, through wire 44 and thence through the switch

arm 45, contacts 47 and 48, conductor 50 and thence through the resistance coil 42.

There is a time indicator 51 which includes an actuating control 52 mounted on top of the frame 10 on the flange 14. By pressing control 52, time indicator 51 starts and runs until the end of the predetermined interval, which is noted by an audible click produced by the action of the timer.

The flange 14 at the right of the casing frame is provided with a bracket means 54 for the support of a blood withdrawing and manipulating loop instrument 55. This instrument is of the ordinary type employed in withdrawing blood from a bird, the instrument including for this purpose a handle 56 which carries at one end a needle 57 used in letting a small amount of blood from a fowl. At its opposite end, the instrument is formed with a loop 58 in which the let blood may be gathered and deposited on one of the numbered squares, shown at S, of the test sheet 21. Also formed in the flange 14 at the right of the casing frame is a well 59 which extends into the interior of the frame. This well is formed to receive a bottle or other receptacle containing antigen. This antigen in regulated quantities is mixed with the blood of birds deposited on the squares of the test paper, the antigen contained within the receptacle being heated by the coil 42. The time indicator 51 is then operated through actuation of the control 52, the operation resulting in uniform, clear, decisive and readily determined reactions between the blood undergoing testing and the antigen admitted therewith, so that blood containing or not containing infection-causing bodies may be rapidly determined. The apparatus is light in weight and may be readily lifted and manipulated when in use. The paper sheets may be rapidly substituted for one another, enabling a large number of fowls to be examined under reliable conditions and in the shortest possible time.

What is claimed is:

1. Apparatus for conducting biological tests comprising: a rigid-walled case, a table member of heat-conducting material mounted horizontally on the top of said case and adapted for the reception of a flexible and removable test sheet, movable clamping means carried marginally of said table member for retaining such a sheet in a fixed heat-receiving position on said table member, heating means embodying an electrically energized heating resistor mounted in said case, said resistor including an operating circuit, and a thermostatic switch mounted on the under side of said table member for opening and closing said circuit to maintain said table member at a substantially uniform temperature during a given heating period.

2. Apparatus for conducting biological tests comprising: a rigid-walled case, a table member of heat-conducting material mounted horizontally on the top of said case and adapted for the reception of a flexible and removable test sheet, clamping means for retaining such a sheet in a fixed position on said table member, heating means embodying an electrically energized heating resistor mounted in said case, said resistor including an operating circuit, a thermostatic switch mounted on the under side of said table member for opening and closing said circuit to maintain said table member at a substantially uniform temperature during a given heating period, and a timing indicator carried by said case for indicating the duration of predetermined observed heating periods of said heating means.

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3. Apparatus for conducting biological tests comprising: a rigid-walled case, a table member of heat-conducting material mounted horizontally on the top of said case and adapted for the reception of a flexible and removable test sheet, clamping means for retaining such a sheet in a fixed and taut heat-receiving position on said table member, heating means embodying an electrically energized heating resistor mounted in said case, said resistor including an operating circuit, a thermostatic switch mounted on the under side of said table member for opening and closing said circuit to maintain said table member at a substantially uniform temperature during a given heating period, and a manually operated variable timing indicator carried by said case for indicating the duration of observed heating periods of said heating means.

4. Apparatus for conducting biological tests comprising: a case embodying a substantially rectangular frame, a table member of heat-conducting material positioned horizontally on the top of said frame, a panel stationarily supported within the confines of said frame below said table member, a heat-liberating electrically energized resistor carried by said panel, said resistor including an operating circuit, a thermostatically operated switch responsive to the temperature of said table member for opening and closing said circuit automatically to maintain the surface of said table member at a substantially uniform temperature, a manually operated timing indicator disposed in said circuit for indicating observed operational period of said heating means, and clamping means for maintaining a paper test sheet in taut unwrinkled contact with the upper surface of said table member.

5. Apparatus for conducting biological tests comprising: a case embodying a substantially rectangular frame defining an internal heating

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chamber, a table member comprising an imperforate panel of heat-conducting material positioned horizontally on the top of said frame and closing the top of said heating chamber, a heating element supporting base arranged in said chamber beneath said table member, a heat-liberating electrically energized resistor carried by said base, an operating circuit for said resistor, means for insulating said resistor from said base, a thermostatically operated switch responsive to the temperature of said table member for opening and closing said circuit automatically in maintaining said table member at a substantially uniform temperature when in operation, and hingedly movable clamping means carried by said case, said clamping means having contact with a flexible test sheet disposed in removable heat-receiving relation with the upper surface of said table member, said clamping means serving to maintain said test sheet in a taut, unwrinkled contact with said table member, whereby to transmit the heat of the latter directly to said sheet.

H. SUE TERRY,

Executrix of the estate of Robert Wood Terry, deceased.

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