Nov. 8, 1949 W. L. MELTON 2,487,161

EXPLOSIVE PROOF TEST TUBE HEATER

Filed April 23, 1946 2 Sheets-Sheet 1

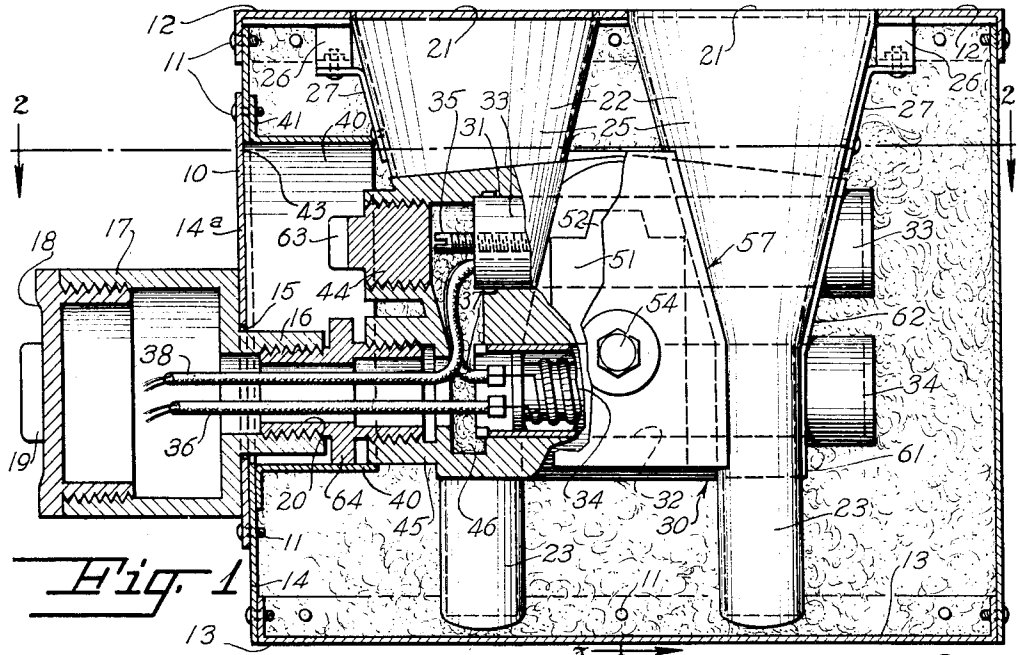


Fig. 1

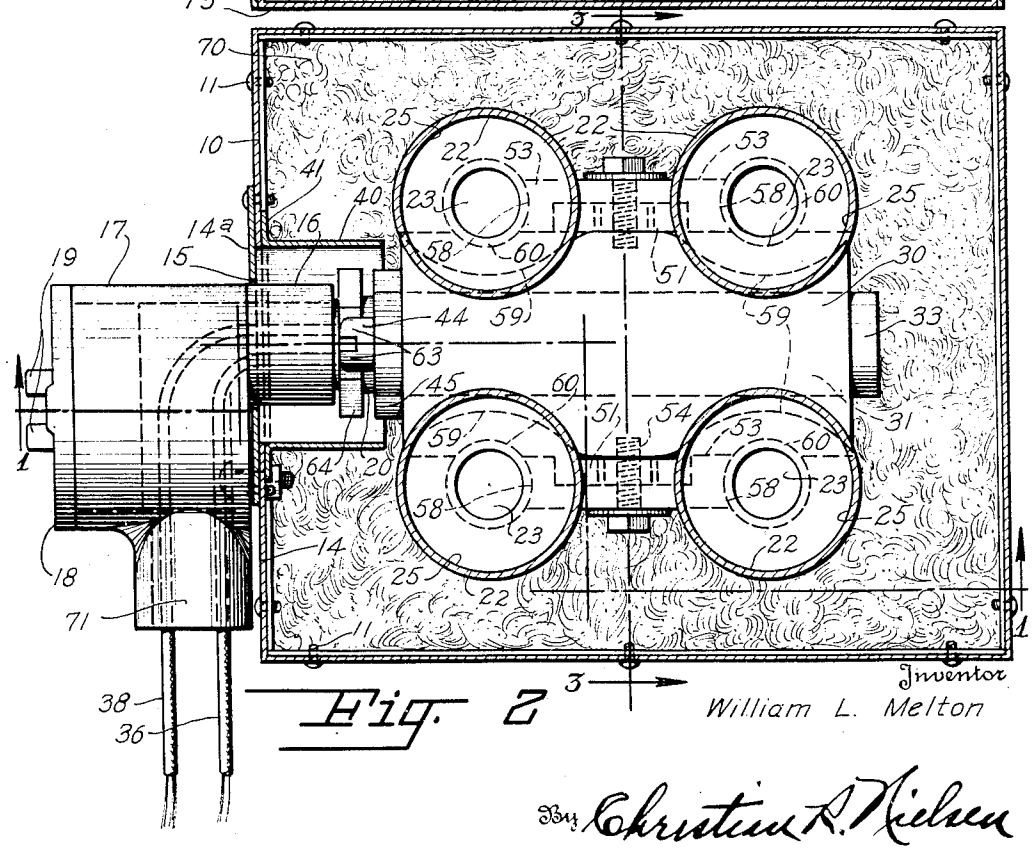


Fig. 2

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EXPLOSIVE PROOF TEST TUBE HEATER

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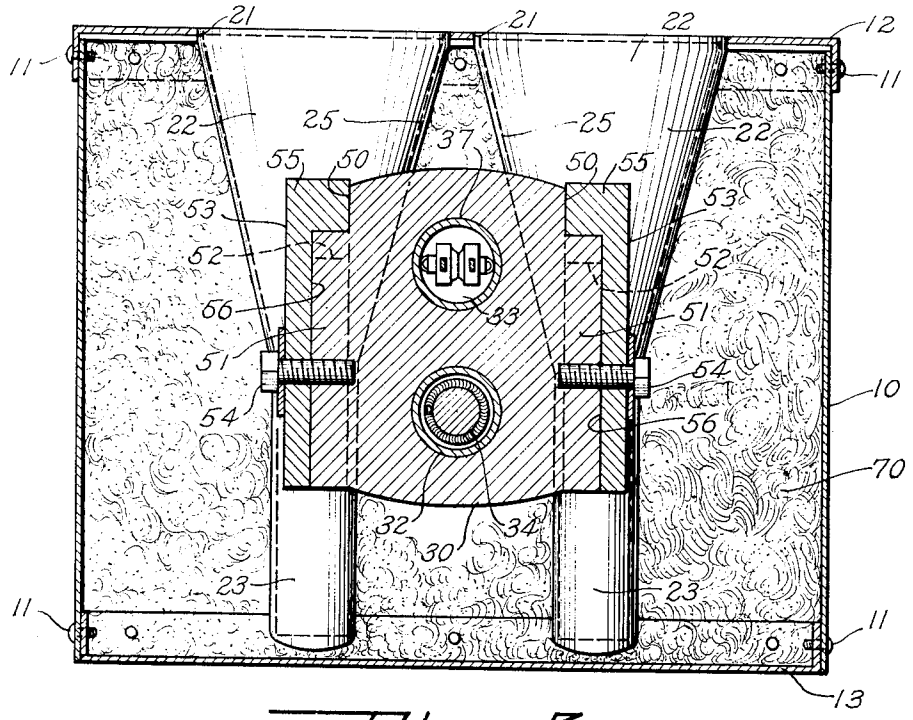


Fig. 3

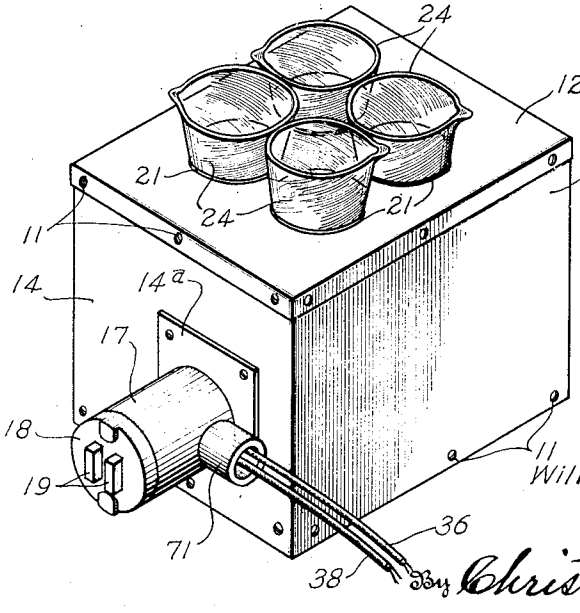


Fig. 4

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EXPLOSIVE PROOF TEST TUBE HEATER

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2 Claims. (Cl. 219—43)

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This invention relates to heaters for test tubes. An object of the invention is the provision of a practical and compact unit for heating a plurality of test tubes uniformly in such a manner that there will be no danger of igniting fluid vapors emanating from the tubes.

Another object of the invention is the provision of a compact and controllable unit in which a plurality of test tubes may be heated simultaneously while confining the heating unit in a metal casting which is in close association with the tubes and isolating said unit from the atmosphere.

A further object of the invention is the provision of a compact unit having heating cells therein for receiving test tubes with a controllable electrical heating unit mounted in a metal casting associated with the cells and insulated from exterior influence.

The invention consists in the novel construction, arrangement and combination of parts hereinafter more particularly described and claimed.

In the drawings:

Figure 1 is a vertical section taken along the line 1—1 of Figure 2.

Figure 2 is a horizontal section taken along the line 2—2 of Figure 1.

Figure 3 is a transverse vertical section taken along the line 3—3 of Figure 2, and

Figure 4 is a view in perspective of the heating unit showing test tubes in place.

Referring now more particularly to the drawings, 10 designates a rectangular-shaped metal housing having side walls to which are secured by means of bolts 11 a flanged top 12 and a flanged bottom 13.

A front wall 14 has a cover plate 14—*a* provided with an opening 15 through which is inserted an internally threaded nipple 16 formed integrally with a cylindrical casing 17 having a closure 18 threaded into the outer end of said casing. Spaced ears 19 on the closure may be engaged by a suitable tool for removing or replacing said closure. A tube 20 has one end threaded into the nipple 16.

The top 12 of the housing has a series of openings 21 which receive the upper ends of heating cells 22 which are frusto-conically shaped at their upper ends but which terminate in cylindrical portions 23 closed at the free ends. Each cell is of sufficient diameter to receive a test tube 24 which has its upper end progressively expanded to conform to the frusto-conical portion of the cell. However, it must be borne in mind that the cells may have different configurations from that

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shown in order to accommodate test tubes of various types. The test tubes may be in the form of beakers which are received by the expanded portions 25 of the cells.

Brackets 26 are secured to the top of the housing and have depending straps 27 secured to the outer walls of said cells for aiding in retaining the cells in position.

A casting 30 formed of aluminum is located centrally and longitudinally of the housing 10. Said casting has a pair of longitudinal passages 31 and 32. Passage 31 receives a thermostatically controlled switch unit 33 of well known construction while passage 32 receives a heating unit 34 of well-known construction. The switch and heating units will not be described in detail. A screw 35 regulates the thermostat.

A wire 36 is connected with a source of current (not shown) and the unit 34, while a wire 37 connects the heating unit in series with the thermostatic switch 33. A wire 38 leads from the switch to the source of current.

The front end of the casting is spaced from the wall 14 and is received by a sleeve 40 which has a flange 41 bolted to the cover plate 14—*a* likewise bolted to the wall 14 to close an opening 43 through which the casting 30 is inserted.

The passage 31 is closed by a plug 44 threaded into the front end of said passage. This plug is located within the sleeve 40 so that it may be readily removed when the plate 14—*a* is detached.

The tube 20 has its inner end threaded into a hollow boss 45 projecting from the front face of the casting 30 and in alinement with the passage 32 housing the heating unit 34. The tube 20 forms a protective means for the wires 36 and 38 after they leave a chamber 46 formed in the front portion of the casting.

The casting 30 (Figures 2 and 3) is cut away along each side at the top to provide a groove 50. A vertically and centrally disposed flat panel 51 is formed integrally with the casting at each side thereof. An extension 52 is located at the top of each panel.

A plate 53 is bolted at 54 to each side of the casting. The inner face of each plate is formed in a complementary manner to the configuration of the panels so that the plates will fit snugly against the sides of said casting. In other words, the upper end of each plate has a rib 55 fitting into the groove 50. The plate has a pocket 56 conforming to the configuration of the panel 51 and extension 52 so that the panel and extension will neatly fit said pocket.

The end edges of each plate are cut away as shown at 57 to conform to the diverging walls of the cells 22. The entire length of each end edge is grooved at 58, to conform to the curvature of the cell walls so that the contacting portions of the cells will neatly fit into said grooves.

The vertical corners of the casting are also provided with grooves 59 continuing into grooves 60 and each pair of coordinated grooves 59 and 60 forms recesses to receive the cells and each recess conforms to the shape of a cell 22 so that said cells will fit neatly into said corners and in close association with the heating unit 34. The plates and panels serve to increase the conduction capacity of the casting.

The rear end of the casting follows the configuration of the adjacent cells. The portion 61 is parallel to the cylindrical portion of the rear cells while the portion 62 of the rear end of the casting is parallel to the divergent portions of said cells.

Spaced lugs 63 are formed integrally on the outer end of the plug 44 and may be engaged by a suitable tool for removing said plug. A hexagonal collar 64 is formed on the tube 20 intermediate ends of said tube so that a wrench may be applied to said collar for turning the tube either for removing or for replacing the same.

Insulating material 70 which is fire-proof is filled into the housing and completely surrounds all parts except those which are contained within the sleeve 40 at the front end for cutting down the loss of heat. The wires 36 and 38 are brought through a nipple 71 attached to and in communication with the casing 17.

When the wires 36 and 38 are connected with a source of current in the usual maner, the unit 34 will be heated and since the cells are in conductive relation with the aluminum casting 30 and the plates, said cells will be heated and likewise the test tubes and their contents will be heated to the proper temperature.

The thermostat in the passage 31 will control a switch embodied in the member 33. The screw 35 is adjusted to regulate said thermostat before the plug 44 is screwed in place.

The casting is maintained centrally of the housing by the casing 17 engaging the outer face of the closure 14—*a*, the nipple 16, and the tube 20 and the integrally formed collar 64 resting on the lower portion of the sleeve 40 (Fig. 1). The bottom of the casting also rests on the insulating material 70.

Although a preferred and practical embodiment of the invention is disclosed herein, it is to be understood that various modifications may be made within the scope of the appended claims.

I claim:

1. A heating apparatus for test tubes comprising a housing, a metallic casting located centrally of the housing and insulated therefrom, heating cells adapted to receive test tubes and extending vertically into the housing from the top of said housing, said casting having a longitudinal passage therein, a heating unit mounted in said passage, the cells being in conductive relation with the casting, a tube threaded into said casting in alinement with the passage, electric wires in the tube and connected with the heating unit, an end of the housing adjacent the tube provided with an opening, a closure for said opening having an outlet for said wires in the tube, and a sleeve in the housing embracing the opening for maintaining the opening free of insulation.

2. A heating apparatus for test tubes comprising a housing having a narrow elongated opening at one end, a removable closure for said opening and provided with a passage, a casting insertible through the opening and located centrally of the housing, a tube having one end threaded into the casting, a casing located exteriorly of the closure and provided with a nipple projecting through the passage in the closure, the other end of the tube being threaded into the nipple, a sleeve in the housing embracing the opening in the housing, means on the tube resting on the sleeve and cooperating with the casing and nipple for aiding in supporting the casting within the housing an electric heating unit in the casting, heating cells within the housing in conductive relation with the heating unit, and wires carried by the tube and connected with the heating unit.

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