June 11, 1935. R. B. MEYER 2,004,125

TEMPERATURE CONTROLLED CABINET FOR ELECTROMECHANICAL OSCILLATORS

Filed Aug. 20, 1931 2 Sheets-Sheet 1

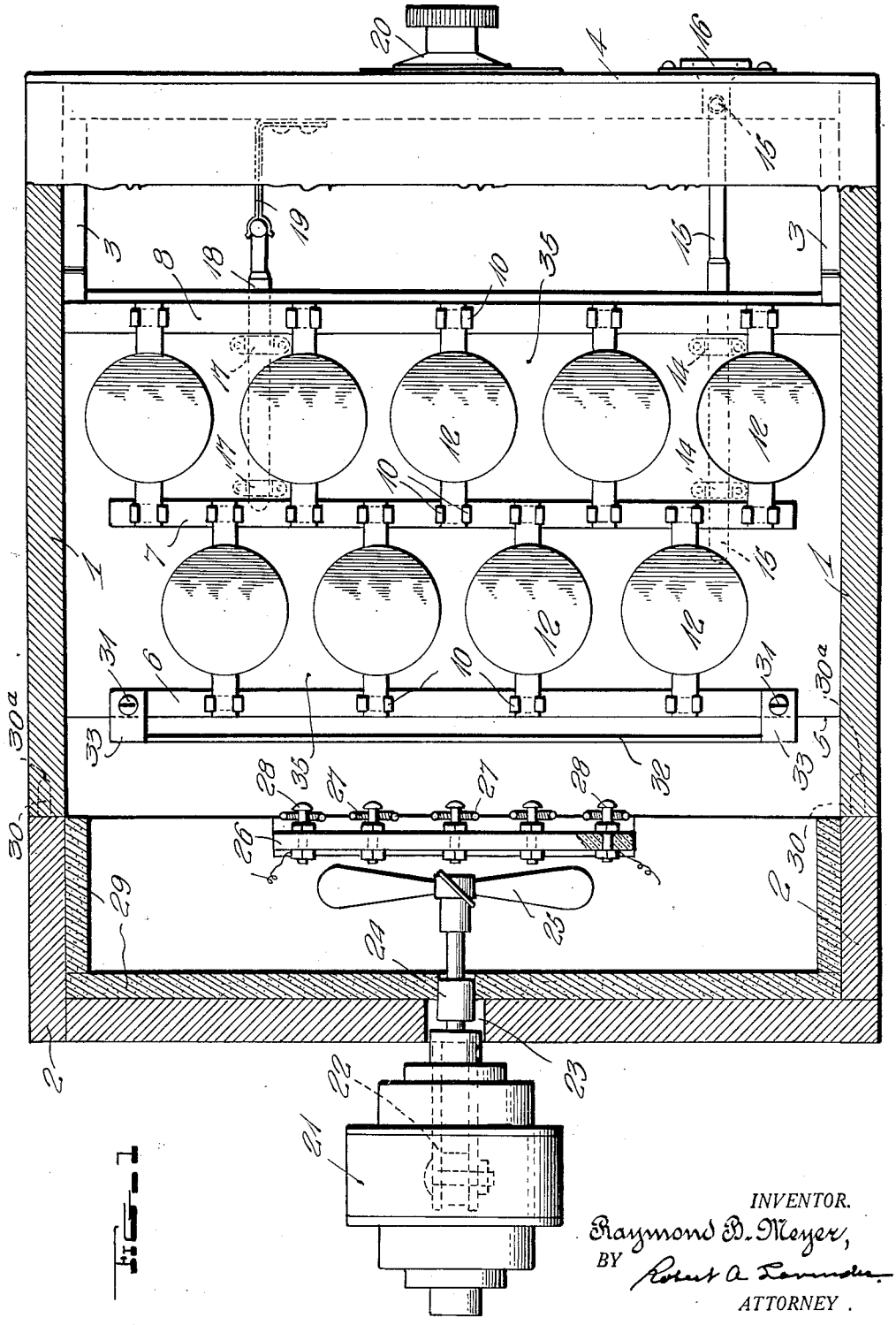

Fig. 1

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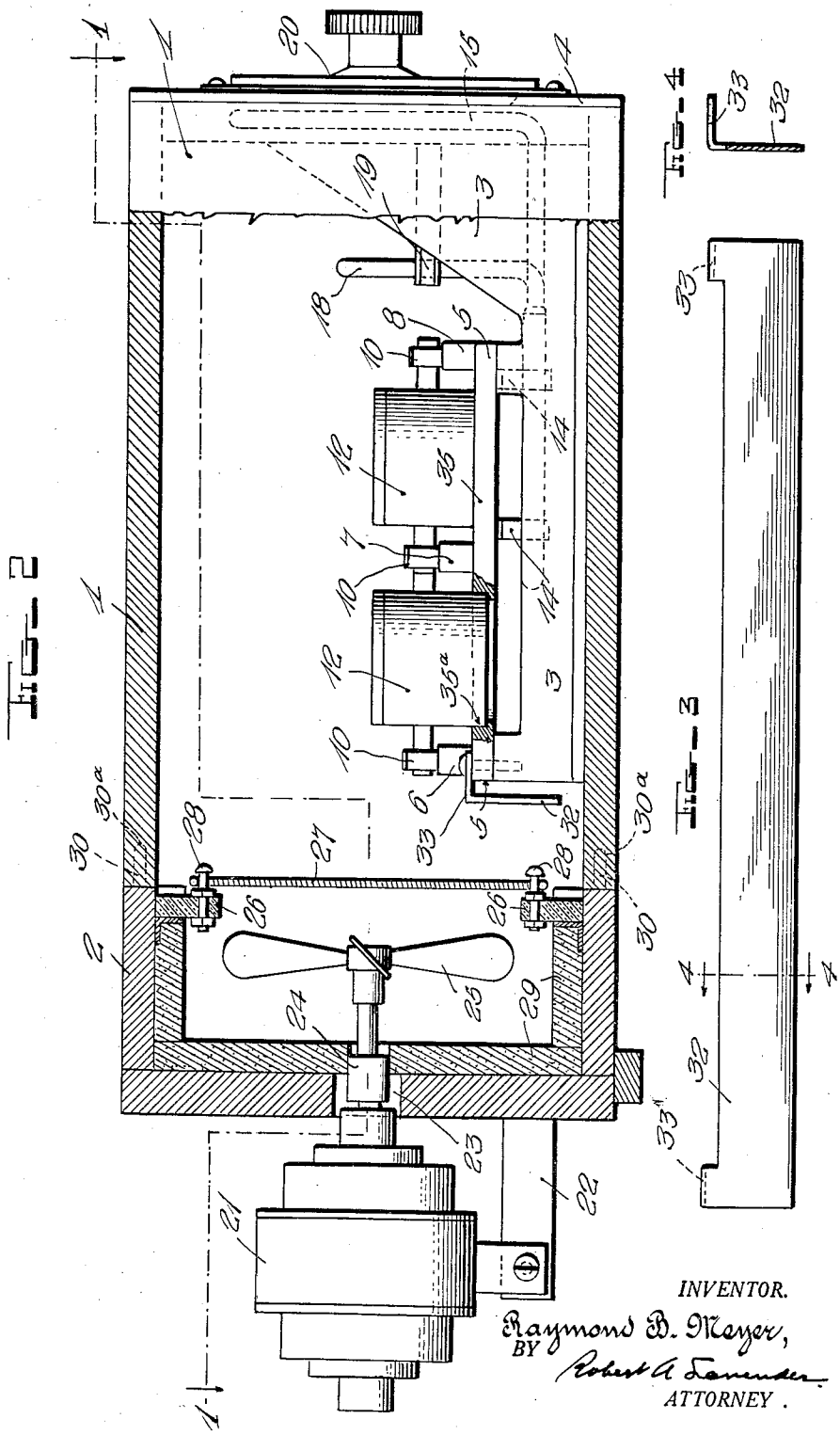

FIG. 2

FIG. 4

FIG. 3

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TEMPERATURE CONTROLLED CABINET FOR ELECTROMECHANICAL OSCILLATORS

Raymond B. Meyer, Washington, D. C.

Application August 20, 1931, Serial No. 558,407

5 Claims. (Cl. 219—19)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

My invention relates broadly to high frequency oscillation systems and more particularly to a constant frequency control system for high frequency oscillators.

One of the objects of my invention is to provide an improved construction of mounting means for electromechanical vibrators in a high frequency oscillator system.

Another object of my invention is to provide a construction of temperature controlled cabinet apparatus for housing electromechanical vibrators with parts so arranged that the electromechanical vibrators are readily accessible for removal, insertion or repair.

Still another object of my invention is to provide a construction of temperature controlled cabinet and an arrangement of electromechanical vibrators therein, wherein the electromechanical vibrators are carried upon a frame which is removable through the front of the cabinet structure while the heating apparatus may be detached from the temperature controlled cabinet at the rear thereof.

A further object of my invention is to provide a construction of temperature controlled cabinet for electromechanical vibrators, wherein the heating apparatus is wholly removable from the cabinet structure which houses, the electromechanical vibrators for permitting repair and adjustment of the heating apparatus without disturbing the mounting of the electromechanical vibrators within the cabinet structure.

A still further object of my invention is to provide an arrangement of baffle plate within a temperature controlled cabinet structure by which direct drafts of convection currents against the thermostats are avoided in order to secure uniform temperature contol of the cabinet in which the electromechanical vibrators are mounted.

Other and further objects of my invention reside in the construction of temperature controlled apparatus as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a horizontal sectional view taken through the temperature controlled cabinet structure of my invention substantially on line 1—1 of Fig. 2 with parts shown in plan and illustrating the arrangement of the electromechanical vibrators within the cabinet structure; Fig. 2 is a lateral cross-sectional view taken through the temperature controlled cabinet structure of Fig. 1 with parts shown in side elevation; Fig. 3 is an elevational view of the baffle plate employed in the temperature controlled cabinet structure of my invention; and Fig. 4 is a cross-sectional view taken through the baffle plate on line 4—4 of Fig. 3.

Referring to the drawings in detail, reference character 1 designates a cabinet structure which forms a housing for a multiplicity of electromechanical vibrators such as piezo electric crystal elements which must be maintained at constant temperature in order to secure constant frequency control from the electromechanical vibrators. The cabinet structure 1 has a rear detachable housing 2 which may be connected to the cabinet structure 1 or removed therefrom. Guide pins 30 extending from the rear end closure 2 project into sockets 30*a* in housing 1, thereby aligning the end portion 2 with the cabinet structure 1. The cabinet structure 1 is arranged to receive a horizontally removable frame 3, which may be projected into the cabinet structure 1 or removed therefrom through the front of the cabinet structure 1, across which the vertically extending panel 4 is arranged to fit. The horizontal frame 3 which extends rearwardly from the front of the cabinet structure 1 terminates in a rear edge 5. A plurality of laterally insulated strips 6, 7 and 8 are supported from frame 3 and each serve to support clip members shown at 10. The clip members 10 are aligned on the insulated strips 6, 7 and 8 in offset positions and are adapted to receive oppositely directed terminals extending from piezo electric crystal containers indicated at 12. In order to provide for the circulation of convection currents in immediate contact with the crystal containers and to insure the rigid mechanical assembly of the crystal containers 12 within the cabinet structure, the top plate 35 is apertured in each of the crystal container positions as represented in cross section in Fig. 2 at 35*a*. In this way the lower plate of the crystal container is directly subjected to the passage of convection currents beneath the horizontally extending support 35 at the same time that the individual crystal containers 12 are rigidly maintained in position within the housing 1. Beneath the supporting plate 35 clip members 14 provide suspension means for the thermometer 15. The thermometer 15 has an upstanding end aligned with an observing window 16 in the front panel 4. Clips 17 are supported from the under side of the horizontally disposed supporting plate 35 for supporting the thermostat 18. The thermostat 18 is supported with respect to the rear of the panel 4 by laterally extending clamps 19 which also serve to connect the thermostat with the temperature regulating system in the apparatus of my inven-

tion. A switching mechanism is controllable from a rotatable knob 20 on the front of panel 4 for selectively connecting the desired electromechanical vibrator in the oscillator circuit. At the rear of the cabinet structure and secured to the removable end portion 2 by means of bracket 22, I mount a driving motor 21. Motor 21 drives a shaft 24 which projects through aperture 23 in the rear of the removable end portion 2 of the cabinet structure. Shaft 24 drives fan 25 which is disposed immediately behind the vertically supported heater coils 27.

The heater coils 27 are supported by stud members 28 which are disposed in spaced positions along the laterally extending insulated strip members 26. The heater coils 27 are arranged substantially in alignment with the plane along which the end portion 2 of the cabinet system is removed from the cabinet structure 1. By this arrangement the heater coils may be brought in close proximity to the electromechanical vibrators carried by conductors 12 and yet the heater coils may be readily removed for the repair of the heater coils by the removal of the end portion 2 from the main housing 1. The end portion 2 is provided with suitable heat insulation which I have represented at 29 for directing heat toward the piezo electric crystal containers within housing 1.

Forced circulation of convection currents is established by rotation of fan 25 immediately behind heater coils 27 for moving the main body of the air above the piezo electric crystal containers. In order to avoid the direct draft of heated convection currents against the actuating portion or bulb of thermometer 15 or control thermostat 18, and also to insure the uniform distribution of heat throughout the cabinet structure, I provide a heat conductive baffle plate 32 as shown. The heat conductive baffle plate 32 is provided with laterally extending tongues 33 at opposite ends thereof which are supported at 31 adjacent opposite ends of supporting plate 35 and immediately adjacent the rear edge 5 of the removable frame structure 3. The heat conductive plate 32 is heated by forced circulatory currents directed through heater coils 27 from fan 25 and serves to distribute heat uniformly throughout the cabinet structure at the same time that convection currents are deflected from direct flow over the ends or actuating portions of the thermometer 15 and thermostat 18 allowing the thermometer 15 and thermostat 18 to register the average temperature of the cabinet structure and thereby increase the precision of temperature control within the cabinet structure.

Removal or replacement of any one of the containers 12 may be accomplished by withdrawing frame 3 from cabinet housing 1. Repair of the heater coils or heat circulating apparatus may be accomplished by removing the end closure 2 by withdrawal of pins 30 from sockets 30*a* without disturbing the mounting of the electromechanical vibrators within the housing 1. The assembly of the equipment of my invention is such that an entire replacement unit may be provided when necessary and installed in cooperation with those parts of the apparatus which do not require replacement.

The apparatus of my invention has been found to be very practical in its construction and efficient in its operation. While I have described my invention in one of its preferred embodiments, I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A temperature controlled cabinet comprising a housing open at its ends, a removable panel closing one end of said housing, a frame for supporting electromechanical vibrators secured to said panel and adapted to be slid into and out of the housing as the panel is moved into and out of place, temperature responsive means mounted on said frame for controlling the temperature within said housing, a removable closure for the other end of said housing, means carried by the removable closure for heating the air in the housing and circulating the air to maintain the electromechanical vibrators at uniform temperature and baffle means mounted on said frame between the actuating portion of said temperature responsive means and the air circulating means for shielding the temperature responsive means from the direct flow of air from the air circulating means.

2. A temperature controlled cabinet comprising a housing open at its ends, a frame for supporting electromechanical vibrators slidable into and out of said housing through one end thereof, a panel for closing the last mentioned end of the housing connected with the outer end of said frame and disposed in a closing position when the frame is moved to a position wholly within the housing, temperature responsive means mounted on said frame for controlling the temperature within said housing, a removable closure for the other end of said housing, air heating means carried by the removable closure and removable from the housing with the closure and a baffle mounted between the actuating portion of the temperature responsive means and the air heating means for shielding the actuating portion of the temperature responsive means from the direct flow of air from the air heating means.

3. A temperature controlled cabinet comprising a housing open at its ends, a frame horizontally movable into and out of said housing through one end thereof, a panel for closing the last mentioned end of said housing when said frame is entirely within the housing, said frame including side bars having their outer ends secured to said panel, a shelf carried by said side bars and supported in an elevated position within the housing, temperature responsive means for controlling the temperature within said housing mounted adjacent the under side of said shelf, casings for electromechanical vibrators mounted upon said shelf, a removable closure for the other end of said housing, heating means carried by said closure, means carried by said closure for circulating air in the housing through the heating means and about the frame and the casings carried thereby, the heating means and air circulating means being removable with the removal of said closure and a baffle means mounted between the actuating portion of the temperature responsive means and the air heating and circulating means for shielding the actuating portion of the temperature responsive means from the direct flow of air from the air heating and circulating means.

4. A temperature controlled cabinet compris-

ing a main housing section open at its ends, a panel to close one end of the main housing section, a frame secured at its outer end to said panel and movable into and out of the housing section, casings for electromechanical vibrators mounted upon said frame, an auxiliary housing section removably held in closing relation to the other end of the main housing section, the auxiliary housing section being open at its inner end and having a head closing its outer end, means within the auxiliary housing section for supporting a heater in spaced relation to its head, and an air circulating fan in the auxiliary housing section between its head and the heater in the cabinet above and below said frame when the auxiliary housing section is in place.

5. A temperature controlled cabinet comprising a separable two part housing having a main section open at its ends and an auxiliary section at one end of the main section open at its inner end and closed at its outer end, a panel closing the other end of the main section, a frame for supporting an electromechanical vibrator connected with said panel and movable into and out of the main housing section through the end thereof closed by the panel, the auxiliary housing section being detachable from the main housing section and releasably held in alignment therewith, a heater at the inner end of the auxiliary housing section, and means in the auxiliary section between the heater and closed outer end of the auxiliary housing section for circulating air currents through the heater and main housing section about the frame.

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