March 19, 1940. L. A. BATTERMANN 2,194,414

CALIBRATING DEVICE

Filed March 21, 1936

Fig. 1

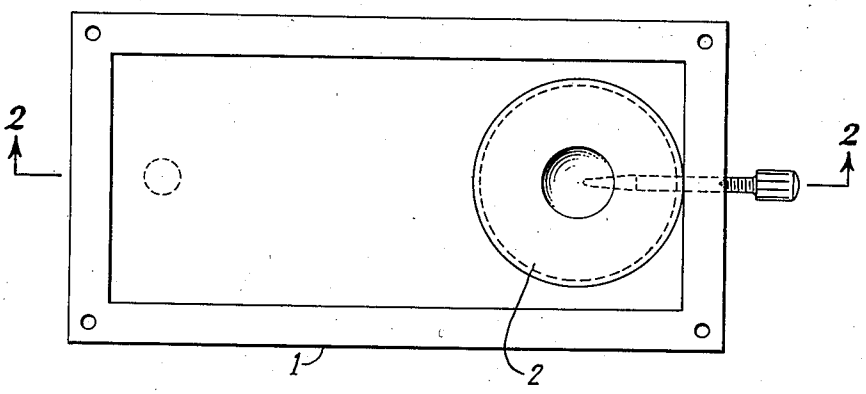


Fig. 2

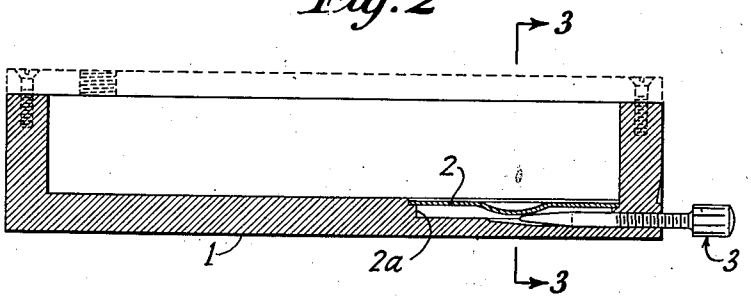


Fig. 3

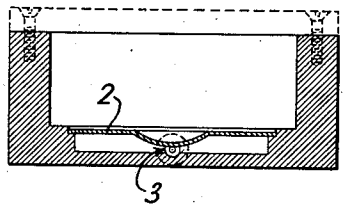
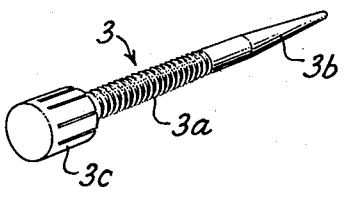


Fig. 4



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CALIBRATING DEVICE

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2 Claims. (Cl. 297—3)

This invention relates to a new and novel calibrating device for calibrating temperature control systems.

This invention is particularly adapted for calibrating frequency control devices and deals more specifically with the variation of temperature control devices for piezo-electric crystals.

One of the features of this invention is the utilization of a diaphragm to change the volume within the block of a temperature control system such as those similar to the Young et al. docket 5,889, filed October 15, 1931, Serial No. 568,962, now Patent No. 2,070,967, dated February 16, 1937.

Previous to this invention, temperature control devices were generally calibrated solely by the operator observing the device and turning a stop cock to the regulating position when the temperature of the block had risen to the desired value as indicated by a thermometer in the block. Due to the extreme fineness of adjustment required and the fact that the temperature as indicated by the thermometer generally lags behind the direct block temperature during the initial adjustment, it is nearly impossible to obtain exactly the setting desired. Having adjusted the device for regulation, it has been found that after a period of several seconds the temperature will drift to a higher value because of leakage of the fluid inside the block.

It is an object of this invention to obviate all troubles of calibration for the reason that after an approximate setting by the original method the calibration can then be trimmed by means of this invention to a greater precision of adjustment.

This invention will also provide a means for resetting the regulator when it is drifting any appreciable amount. Furthermore, very fine frequency adjustment can also be made directly by adjustment of this invention and exact setting can be made almost instantly.

This invention will best be understood by reference to the accompanying drawing, in which:

Fig. 1 is a plan view of the calibrating device;

Fig. 2 is a longitudinal cross-section of Fig. 1, the section being taken on lines *a—a*;

Fig. 3 is a cross-section of Fig. 1, the section being taken on lines *b—b*; while

Fig. 4 is a detailed view of the plunger.

Referring now in detail to Figs. 1, 2 and 3, the lower part of the block 1 is that of the heating block or container of the temperature control system, as is disclosed in application Ser. No. 568,962, filed October 15, 1931, now Patent No. 2,070,967 dated February 16, 1937, and in describing this invention the application to the above-mentioned docket will be described. In the lower portion of block 1 is mounted a diaphragm 2 which is made of any suitable resilient metallic material such as phosphor bronze, brass or the like, and is firmly secured at the edges of the recessed portion 2*a* by spinning, and is made oil-tight at the edges by soldering. The diaphragm 2 must be made so as to secure proper flexibility to remain unchanged by the normal temperature changes of regulating pressure and is only to be affected by the direct pressure and the means of adjustment. Adjustment of the diaphragm is obtained by means of a suitable plunger member 3, which is threaded at the central portion thereof as is indicated by 3*a*, the end portion 3*b* being tapered, the opposite end 3*c* being knurled. Plunger 3 is threaded in block 1 so that the tapered portion comes beneath the diaphragm 2 which bears against the side of the depressed portion 4 which is located in the middle of the diaphragm. It is desired that the knurling on the portion 3*c* be made by a plurality of evenly spaced lines which may be used in conjunction with a single mark on the side wall of block 1 to indicate the exact setting of the plunger 3 with respect to the diaphragm 2, this setting may be calibrated in any units although it is preferable to have it calibrated in tenths of degrees.

The operation of this device is as follows:

As the plunger 3 is screwed into block 1, the tapered end 3*b* of the plunger will bear against the side of the depressed portion 4 in the center of the diaphragm 2. This will cause the diaphragm to become flexed upward and in effect decrease the volume in the block 1. As plunger 3 is screwed out of the block, the resiliency of diaphragm 2 causes it to return to the unflexed portion as the pressure at the end of the plunger is increased, thus increasing the volume of block 1. The initial setting of the plunger will be at some immediate setting so that the adjustment made will be in either direction. When it is desired to make initial setting of a temperature control device similar to that of application Serial No. 568,962, filed October 15, 1931, now Patent No. 2,070,967, dated February 16, 1937, it will be found after a period of time that the setting is, for example, one-tenth degree lower than desired. One can quickly obtain the exact setting by turning the plunger 3 counterclockwise the proper amount, that is, assuming that plunger 3 has been made with right hand threads. Should the temperature control device lose its calibration

after being placed in operation for a period of time, it can be brought back to desired regulation for the proper temperature by adjustment of plunger 3.

This invention may also be provided with a complex diaphragm such as a Sylphon bellows, instead of the single diaphragm, also, a plunger may be used without a diaphragm which has an oil tight packing gland to serve the same purpose so that the volume inside the block decreases as the plunger is introduced into the block. Also, any plunger or eccentric member which will flex a diaphragm bellows or similar device to change the volume inside block 1 may be used. The size of the diaphragm or even a plurality of diaphragms may be employed to govern the amount of variation desired.

Therefore, this invention should not be limited to the specific forms shown and should only be limited by such limitations as are clearly imposed in the appended claims.

What is claimed is:

1. A calibration device for a liquid temperature control device comprising a box-like container for the liquid of said temperature control device, a diaphragm located in a depending recessed portion of a flat base plate of said container, threaded means in one of the side walls of said container, an adjustable plunger passing through said threaded means in the wall of said container and located in a plane parallel to the plane of said diaphragm, said plunger having a wedge-like end for causing the diaphragm to flex and change the volume of said liquid in the container, and an operating knob located at the end of said plunger having lines to cooperate with an indicating mark on the side of said container to indicate the temperature at which said plunger is set.

2. A calibration device for a liquid temperature control device comprising a box-like container for the liquid of said temperature control device, said box-like container having a substantially heavy flat base member, a circular diaphragm retained in a recessed portion of the base of said container, the said diaphragm having a central recessed portion, an adjustable plunger located in the side of said container, said plunger having a wedge-like end which rests on the end of said recessed portion of said diaphragm to cause said diaphragm to become flexed or unflexed as it moves through the side of said container.

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