

Letters To The Editor

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A SIMPLE ARRANGEMENT FOR SEASONING ANEROIDS AND BIMETALS USED IN RADIO-METEOROGRAPHS

The aneroids fitted in radio-meteorographs have to be seasoned to remove errors due to hysteresis, so that one may be sure that the same displacement of the diaphragms occur for the same value of pressure to which it is subjected at different times. The aneroid discs used in the radiosonde instruments of the India Meteorological Department are punched out of beryllium copper sheets and before soldering the capsules they are annealed in a furnace at a temperature of $315^{\circ} \pm 5^{\circ}\text{C}$ for $1\frac{1}{2}$ hours. For seasoning these aneroid elements an automatic arrangement has been devised to subject them to a number of cycles of pressure changes, from the pressure of one atmosphere to 50 mb. The arrangement is shown in Fig. 1 and is described below.

The meteorographs are placed in an air-tight chamber in which the pressure can be reduced by a motor-driven vacuum pump. The equipment consists of (a) an aneroid P linked to an arm R moving on contacts X and Y*. This unit is placed inside the chamber in which the aneroids are seasoned, (b) two electromagnetic mercury switches (R_1 and R_2 are coils and S_1 and S_2 are the corresponding mercury switches), (c) a vacuum pump Z which exhausts the chamber in which the aneroid capsules are seasoned, (d) the valve V which is operated by an electromagnet and lets in air into the system at a prescribed rate through a capillary tube and (e) a stepdown transformer (220 to 6 volts) T for operating the coils of mercury switches and the electromagnetic valve V.

The contact X on which the pressure arm R moves is a copper strip mounted on an insulator and the contact Y is another piece; R will contact X at all pressures below about 1000 mb upto about 50 mb; the arm R will touch both X and Y when the pressure is less than 50 mb. X and Y are connected to the coils of the mercury switches. At about 1000 mb the coils of both mercury switches are off, as the arm R will not touch either of the contacts X or Y; the mercury switches S_1 and S_2 are so fixed that when the coils R_1 and R_2 are not excited, S_1 is 'off' and S_2 is 'on'. The mercury switch S_2 is connected in series with the pump Z. As soon as the power is switched on, the pump will start to work, since S_2 is 'on'.

The pressure will gradually fall in the chamber and the arm R will first contact X, but neither coil R_1 nor R_2 will be energised till the arm touches both X and Y when the pressure in the chamber has fallen to about 50 mb. As soon as X and Y are shorted by R, R_1 and R_2 are energised and switch S_2 is 'off' and S_1 is 'on'. The pump stops working and the electromagnetic valve V operates and opens allowing air to leak slowly into the chamber containing the aneroids. The pressure gradually rises in the chamber, and though the contact between R and Y is broken, the coils R_1 and R_2 remain energised, mercury switch S_1 being 'on' and mercury switch S_2 being 'off'. When the pressure comes back to atmospheric value, the arm R gets disconnected from X; now S_1 is 'off' and R_1 and R_2 cease to be energised. S_2 now is 'on' and the pump starts working again and the cycle is repeated.

By this method the aneroid capsules can be subjected to any number of cycles for seasoning without any attention. One can incorporate an electromagnetic counter C to indicate the number of cycles performed.

*This can be easily made by simple modifications in the radio-meteorograph itself

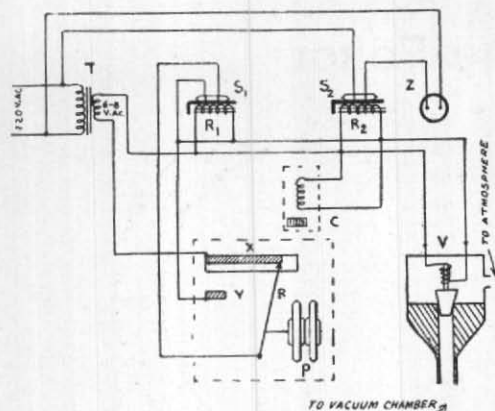


Fig. 1.

The period of the cycle during reduction of pressure or rise of pressure can be controlled with suitable adjustable valves or with suitable sizes of capillary tubes in the system.

The above system can be easily adapted for other applications also. For example, when the bimetal temperature elements of the meteorographs have to be seasoned automatically, the aneroid capsule P can be replaced by a suitable bimetal element and the whole unit placed inside the chamber in which the temperature is controlled. The electromagnetic valve operating the refrigerant will then replace the electric motor of the pump. The warming of the chamber to room temperature can be effected with a suitable heater instead of the leak and the magnetic valve. Fig. 2 shows a system simpler than that shown in Fig. 1. In this arrangement, the two electromagnetic mercury switches are replaced by a D. P. D. T. switch operating on 6—8 volts similar to the one used in refrigerators (*e.g.*, GE 12 HMIA 11A57 relay).

Mention may be made here about the design of the electromagnetic valve V in Fig. 1 to allow air to leak into the seasoning chamber containing the aneroid capsules. A tapering iron piece rests in a cylindrical hole, so that the area of contact is only along a line on the side of the taper, and as a result a

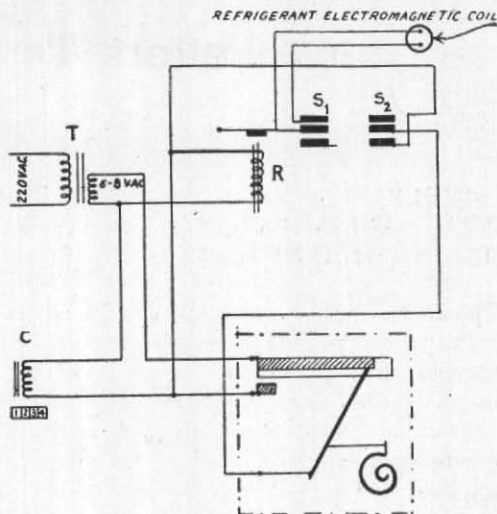


Fig. 2.

R=Relay switch D.P.D.T. working on 6-8 volts A.C.
 $S_1 S_2$ =Contacts capable of carrying 5 amperes

small force is sufficient to lift the tapered valve.

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March 4, 1955.