The excess ethylene was slowly released, with the needle smoothly screwed out, and the reaction mixture was extracted from the tube with the aid of a syringe.

The lead and smooth steel tubes must be changed after each experiment because of irreversible distortion occurring when the contents of the tube are compressed (to 40% in certain experiments). On removing the pressure, the lead tubes form microcracks, through which a small amount of their contents passes into the interior of the shell. The bellows-type tubes do not suffer from these disadvantages. In the presence of a core, the degree of compression of the tube may reach up to 50% without irreversible distortion. This makes it possible to use one tube repeatedly without extracting it from the shell. A disadvantage of the bellows-type tubes is the complexity of the mechanical cleaning of the inner surface.

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High-sensitivity Pirani Gauge with Automatic Recording

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A recording Pirani gauge for the measurement of gas pressures in the range 1×10^{-6}–1 torr has been described.

In laboratory practice Pirani gauges have come to be widely used because of a number of advantages such as small size, simplicity of design, wide range of pressures recorded, the possibility of continuous automatic recording of the readings, etc. However, in many cases their maximum sensitivity and the lower limit of measurable pressure, which is usually 10^{-3}–10^{-4} torr,[1,2] are inadequate. The attempts to improve these parameters usually lead to a considerable increase in the complexity and cost of the apparatus.

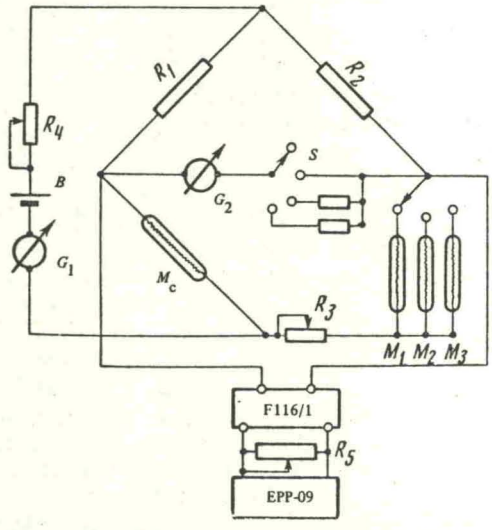

Figure 1. Measuring circuit of the gauge.

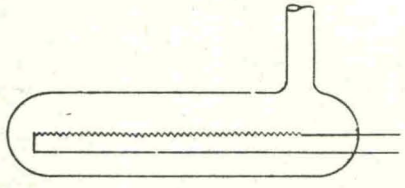

Figure 2. Pressure transducer.

For a number of years we have successfully employed automatically recording Pirani gauges of simple design with a sensitivity up to 1×10^{-6} torr. The measuring circuit of these gauges, which is of the usual bridge type, is presented in Fig. 1. It provides for a possibility of alternate inclusion of three pressure transducers (M_1, M_2, and M_3) located in various parts of the vacuum apparatus. To compensate the variation in room temperature and in the current supplied, a compensation cell M_c is employed; R_1 and R_2 and 300 Ω bifilar Manganin resistances. The bridge is balanced with a resistance box R_3 of type R-33 or R-333.

The bridge is supplied from a d.c. source B with a stabilised voltage of 12 V. The supply current (40 mA) is set by means of a variable wire resistance R_4 and is measured with a milliammeter G_1. The out-of-balance bridge current, which flows when the pressure in the transducer changes, is amplified by a photoamplifier of type F-116/1 and is automatically recorded with an EPP-09 pen recorder. To regulate the degree of amplification, a variable resistance R_5 is included in the external circuit of