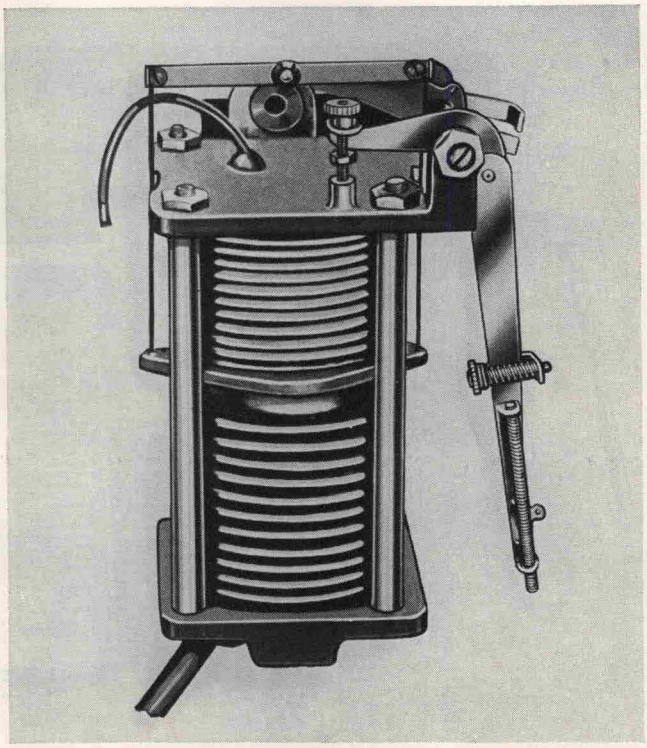

Fig. 8. Absolute pressure gage bellows element.

The *strain gage* consists of a small wire grid bonded to a plastic impregnated paper or cloth which is then cemented to the surface of the process pressure sensing device (usually a diaphragm). When the process pressure is applied, the resulting force moves the diaphragm, which produces a change in the length and diameter of the wire, changing its electrical resistance. This change in resistance is a measure of the force or pressure applied. A precision dc or ac resistance-bridge type of instrument must be used to measure this resistance change in equivalent pressure units. These sensors are used on pressures of 1 psi and greater.

The thermoelectric and ionization sensors are used primarily for the measurement of ultra high, very high, and high vacuums. The *thermoelectric* sensor operates on the principle that the heat loss from a hot wire varies as the pressure of the gas or vapor surrounding the hot wire varies. This variation in heat loss with pressure is relatively large in the high vacuum ranges for which it is used.

Figure 10 illustrates a resistance-bridge type of thermoelectric sensor where the heat lost by the coil of resistance wire in the measuring cell is indicated directly by resistance change in a leg of the bridge circuit. The compensating cell contains a second coil of resistance wire and this is sealed off at a pressure well below 1 Torr abs. This coil is designed so that changes in its resistance with temperature change will balance those changes in the measuring cell resistance and thus automatically compensates for temperature variations.

Figure 11 shows the diagram of a thermocouple type of thermoelectric sensor. The filaments are continuously and uniformly heated by means of the constant voltage

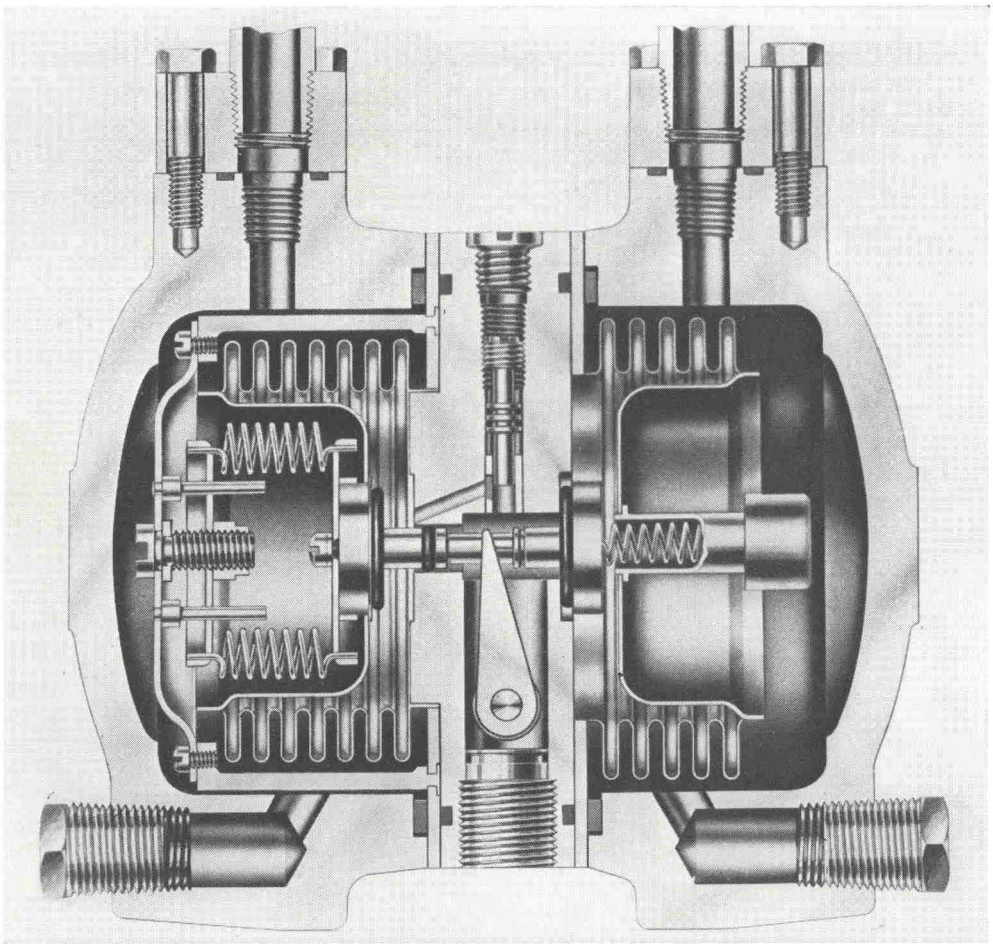

Fig. 9. Differential pressure gage element—bellows type.

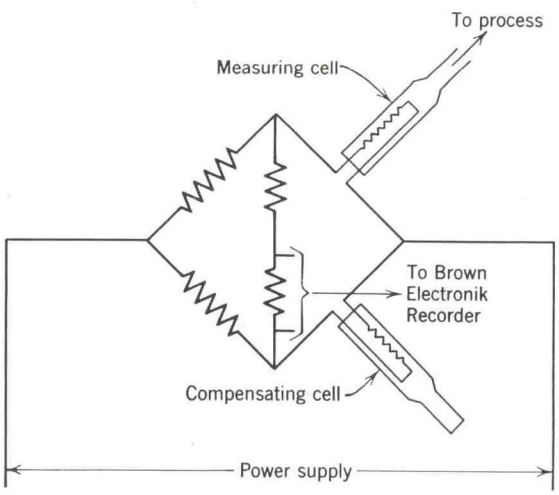

Fig. 10. Circuit of resistance-type thermal gage.