One distinct disadvantage in comparison with the optical types lies in the fact that no warning is given when the zero is being approached. This difficulty is minimized by adjusting the manometer slowly through a capillary leak, or by placing a large bottle in the system as a pressure "buffer."

A full atmosphere's pressure on the manometer side does not break the diaphragm, even though the chamber is completely evacuated. The readings are usually accurate to 0.2 mm. of mercury. The sensitivity may be increased still further if the diaphragm is not required to withstand an atmosphere's difference in pressure. Occasionally the contacts become fouled, presumably by a speck of grease from the stopcock driven along by an inrush of air, but they may be readily regenerated by momentary sparking with a weak induction coil.

This type of manometer has been in constant use for three years in several different researches in this Laboratory and it has proved very satisfactory through many thousand pressure readings.

Summary

A device for measuring the pressure of a gas enclosed entirely in glass is described. A measured air pressure is balanced against the pressure of the enclosed gas through a glass diaphragm and the point of balance is obtained by closing an electrical circuit through a platinum contact fused to the diaphragm. Although similar to earlier devices the apparatus described here is more reliable and easier to construct.

MADISON, WISCONSIN

NOTES

Note on Electromagnetic Vacuum Cut-Off.—The accompanying diagram explains a type of mercury cut-off suitable for high vacuum work. The meniscus at B may be raised and lowered several millimeters by allowing the glass enclosed soft iron, D, in arm, A, to float on the mercury in this arm or be withdrawn entirely by means of a current passing through the magnet winding, which acts as a solenoid. The quantity of mercury is adjusted so that when the iron is withdrawn the top of the meniscus at B is just a millimeter or two below the opening of the inner tube. This permits an unimpeded flow of gas from the system to be evacuated to the pump. When the system is evacuated the iron is permitted to drop and the meniscus B then rises until the opening of the inner tube is effectively sealed off. It is more convenient to constrict very slightly the arm, A, at the top so that the iron weight will stick there when it is withdrawn by means of the solenoid. This permits the use of the cut-off either open or closed without a continuous flow of current. The weight will fall when the arm is lightly tapped with a pencil.

The size of the cut-off may be so designed that the whole apparatus can be immersed in liquid air and the mercury frozen in place, thus reducing the vapor pressure of the mercury. Otherwise a liquid air trap may be inserted between the cut-off and the system to be evacuated. The former procedure is practicable only when the additional volume of such a trap is detrimental. Care must be taken to adjust the volume of arm A so that the meniscus B will not descend below C when atmospheric pressure is admitted to the system. The apparatus acts as a rough vacuum gage as well as a cut-off. It has the following advantages over the usual design of "Y" cut-off. The quantity of mercury is small and may be completely de-gassed. No fresh mercury is being constantly exposed. When atmospheric pressure suddenly enters the system the mercury level will drop so rapidly that no mercury is blown into the vacuum canalization. Contrary to a stopcock there is no chance for outside leakage and no vapor pressure from stopcock grease.

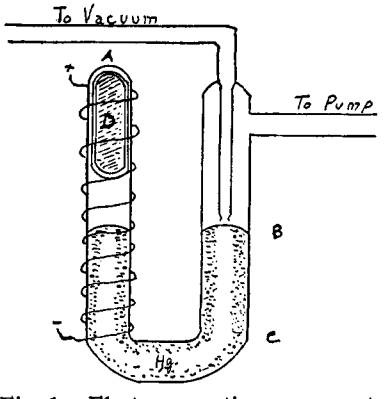

Fig. 1.—Electromagnetic vacuum cut-off.

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Note in Reference to Platinum-Tungsten Welding.—Platinum may be welded direct to tungsten by the following method. The tungsten is cleaned with sodium nitrite. Several coats of platinum are burned into the tungsten from a solution of lavender oil and platinum chloride. The platinum to be welded is then coated with borax and welded to the tungsten in an oxygen flame. This must be done quickly. Gold may very easily be welded to tungsten by first cleaning the latter with the sodium nitrite, then covering with borax and finally plunging the heated tungsten into a molten gold bead. The gold makes an excellent flux for platinum welding when baser metals are a disadvantage.

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