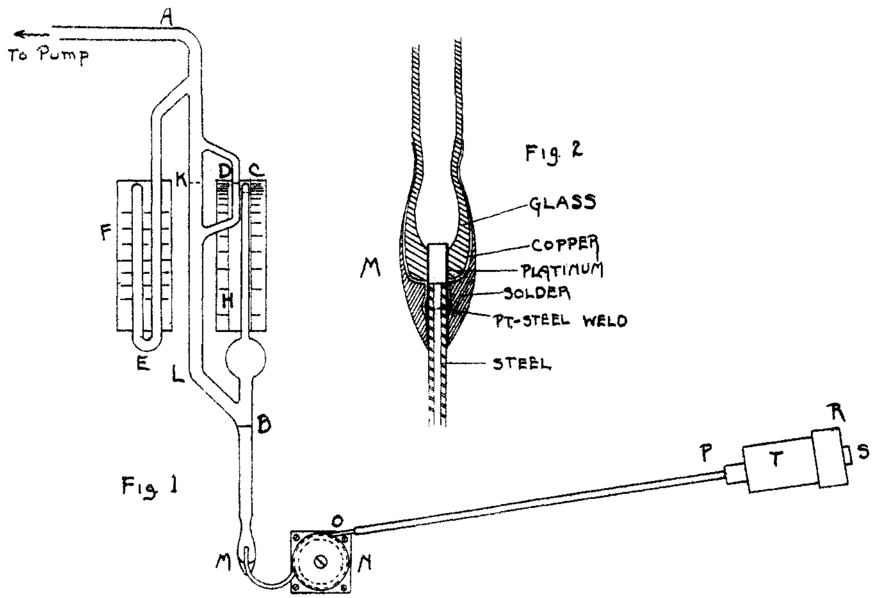
NOTES.

A Simplified Short Vacuum Gauge.[1]—A modified short Gaede gauge[2] has been described by me, in which all rubber connections are eliminated by the use of a ground-glass joint to connect the adjustable mercury reservoir to the evacuated space. This type of gauge has given excellent service over intervals of time limited only by accidental breakage of glass parts. The purpose of this note is to show how a gauge may be constructed along similar lines without the use of a ground-glass joint. This is accomplished by connecting the mercury reservoir *T*, Fig. 1, to the vacuum system *AB* by means of a small steel tube *MR*, which is coiled several times around a cylinder *N* just before entering the glass tube at *M*. The



reservoir *T* is a steel cylinder with thin walls, of sufficient capacity to fill the system *BK* when the arm *OR* is inclined at an angle of 60° with its resting position. At *S* is an opening to facilitate the filling and adjusting of reservoir and tube, and is securely closed by means of a screw.

The coil of steel tube is anchored to the cylinder *N*, or axis of the coil, at the glass end, to avoid strains in the glass parts when the arm is moved. The portion *OP* of the arm supporting the reservoir is made of larger steel tubing, with inside diameter 4 mm. and with thin walls; this is to give greater rigidity to the arm and greater speed in operating the gauge.

The manner of connecting the steel tube to glass tube is shown in Fig. 2. The union is easily effected by means of a small, hollow platinum

[1] Communicated by the manager.

[2] *Phys. Rev.*, **6**, 51 (1915).

cylinder which may be welded to the steel tube and fused into the glass tube. When such a platinum cylinder is lacking, platinum foil may be utilized as in the present case. When the tube made of foil is welded to the steel tube and fused into the glass tube, the latter is silvered and copper-plated. The seam in the platinum tube may then be rendered gas-tight by a layer of solder bridging the copper-plated glass surface and the surface of the steel tube.

The dimensions and operation of the gauge are the same as in the former one. The dimensions of the metal parts are as follows:

N — Metal axis 3 cm. diameter.
OP — 30.2 cm. long, 5 mm. outside diameter.
OM — Coil of steel tubing $^1/_8$ inch outside diameter, $^1/_{16}$ inch inside diameter, 30 inches long, wound on axis *N*.
T — 3.3 cm. diameter.
R — 3.7 cm. diameter.
PS — 9.5 cm. long.

This manner of connecting a mercury reservoir to a glass chamber may be of value in other pieces of apparatus where pressure or volume is required to be adjustable.

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An Improved Form of Thermo-regulator.—The form of thermo-regulator shown in Fig. 1 has been used by the writer for 3 years and found to be very satisfactory. The essential feature is that the adjustments are made by means of a plunger and plunger tube which regulate the height of the mercury with respect to a *fixed* platinum wire.

The apparatus as shown in the cut is made entirely of glass with the exception of the two brass tubes and screws on the plunger and plunger tube, the brass clips (Fahnestock spring binding posts) holding 2 of the wires, and the 3 connecting wires. The brass parts improve both the efficiency and the appearance of the regulator, but are not essential. They may be replaced by a rubber stopper cut out as shown in Fig. 2. The stopper is necessarily cut so as to fit

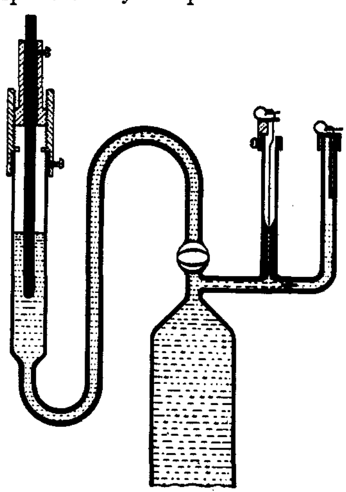

Fig. 1.

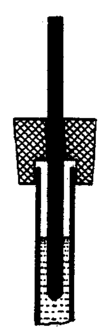

Fig. 2.

the plunger and the plunger tube tightly, else the plunger will not remain in the proper place. The coarse adjustment with such an arrangement is best made by moving the plunger through the stopper, and the fine adjustment by turning both the stopper and plunger, applying at the same time a gentle pull or push. This simple modification of the apparatus is given since the brass attachments are not always readily obtained and are troublesome to make.

The use of a fixed platinum wire has its advantages. Great care need not be taken in the centering of the platinum wire, for if after the wire has been soldered to the cap it is found to be off center, simple bending, as shown in the figure, will remedy this. In the ordinary regulator the electrical connection between the movable platinum wire and the binding post is made through a screw and nut. When the threads become worn or corroded this connection often becomes uncertain and may give rise to considerable trouble. With a fixed wire it is possible to solder the wire, cap and binding post together, thus eliminating any such source of trouble.

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ON SOME HALOGEN DERIVATIVES OF AROMATIC AMINES AND THEIR ANALYSIS. I.[1]

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Received January 9, 1918.

In the course of the study of the effect of the halogens on the reactivity of the aromatic amines, it became necessary to prepare certain iodine substitution products of these amines, and the following paper contains some results of this phase of the work. Hofman[2] showed that aniline reacted directly with iodine yielding *p*-iodoaniline. Later Wheeler[3] and his students investigated the action of iodine on the toluidines and found that substitution products were easily obtained. Our experiments indicate that the chloro- or bromo-substituted anilines are capable of reacting in an analogous fashion with the formation of chloroiodo and bromoiodo derivatives.

The Introduction of Iodine into the Bromoanilines.

Preparation of 4-Bromo-2-iodoaniline.—The general procedure of Wheeler was followed with satisfactory results. A mixture of 25 g. of 4-bromoaniline and 37 g. of iodine was heated under a reflux condenser with 18 g. of pure calcium carbonate, 60 cc. of ether and 60 cc. of water.

[1] Owing to the departure of two of the authors, the investigation, though incomplete, is published. The work will be continued in this laboratory.

[2] *Ann. chim.*, 67, 61 (1848).

[3] *Am. Chem. J.*, 42, 441, 448 (1909); 44, 127, 500 (1910).