metal (Alfa Ventron) is placed in a side arm. Valve 2 is then shut while valves 1 and 3 are left open and the oven regions are again brought to high bake-out temperatures for a few more hours. Thallium is finally distilled into the stem in region C by closing valves 1 and 3 and opening valve 2. Regions A and B are kept hot while the stem is allowed to cool down. Four to eight hours are required to distill enough thallium into the stem in order to maintain densities of a few times 10^{14} atoms/cc. Periodically, valve 3 is opened to allow any "volatile" impurities to escape from the cell. After a few days of running, the cell becomes very clean and pressures below 10^{-10} torr at the pump are commonly obtained when the system is allowed to cool. Even when the cell is run at 950°K, vacuums at the pump are generally around 10^{-8} torr. The pumping speed of our cell, calculated from standard formulas found in Dushman (Dus, 62), is about 1-2 liters/sec.

The details of the quartz valves are shown in Figs. 19 and 20. The valve is basically a ground ball joint connected to a quartz rod and finally to a steel slug vacuum-sealed in a quartz vial. An electromagnet, made from about 60 turns of no. 14 copper wire wound in 3 layers, is placed around the steel slug. Approximately 12-15 amps are required to lift the valve open. Normally used insulating materials are not capable of withstanding the 600°C used in the distilling procedure. The coils are kept from shorting by winding the copper around a teflon form, springing it slightly and applying several coats of dilute Seuereisen ceramic cement (from the Sauereisen Cement Co.). After the cement dires, another layer of wire is wound and painted