(5) Liner and Drift Tube Cooling. A semi-circular distribution manifold is soldered to the end plates of the liner on both top and bottom parts. From this manifold radial tubes lead to fittings on the ends of the 40 foot tubes soldered to each liner panel; thus, the panels are cooled by water flowing through these long tubes in parallel, in circuits that come through the tank at one end, through the distribution manifold, along the panels into the collection manifold, and out through a discharge lead at the opposite end of the tank. Separate circuits are maintained for the upper and lower parts of the liner.

The drift tubes are also cooled in parallel by a third water cooling circuit. Two tubes are supported in openings in the liner frames, with one tube serving as supply header, and the other as collection header. These tubes have nipples hard soldered to them adjacent to each drift tube, into which the 1/4 inch copper tube passing through the drift tube stems are soldered. By introducing the water at one end of the tank and removing it from the other, the cooling water pressure drop through each parallel flow path is maintained the same. Checks upon the operation of the parallel flow system are made by putting hot water through the lines, and feeling all the tubes to see that they are receiving their quota of water, and that no obstructions exist in the individual circuits.

(6) Grids. As was shown in Section III of this paper, radial focusing and phase stability can only be achieved in the machine by introducing charge within the beam; i.e., by arranging the entrance end of drift tubes so that electric field lines terminate within the beam. This was first done by putting 3×10^{-5} inch thick beryllium foils across the entrance of each drift tube. However, sparking in the tank destroyed them, and grids were used instead. There is, of course, greater field concentration on grids than on flat foils. To a first approximation, if one considers a grid to be merely a foil with many holes punched out, the field is increased by a factor equal to the ratio of the total area to the area occupied by conductors, since the same number of lines of force end on the conductor, but on a smaller area.