ficient, however, to judge the suitability of a joining process on the basis of simplified geometries such as diffusion couples. For this reason, several examples of hardware applications have been chosen to demonstrate the flexibility of the gas-pressure-bonding process for solid-phase bonding.

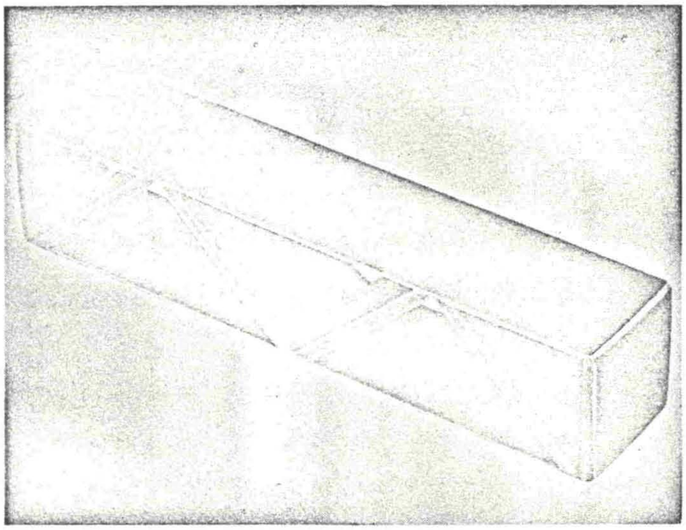

Fig. 18. Truss-supported structure made from columbium. × 1/2.

Truss-Supported Structure

The truss-supported structure shown in Fig. 18 was fabricated from columbium sheet. All twelve joints in the structure were bonded in one operation by gas-pressure bonding at 1200° C. and 10,000 psi for 3 hrs. Parent metal strength was obtained in all joints.

To prepare this specimen, the eight pieces of columbium were sheared and machined from sheet of appropriate thickness. Low-carbon steel was used as internal tooling to form the triangular cavities between the trusses. The tooling is necessary to prevent collapse of the structure during the gas-pressure-bonding operation. The assembly was canned in a low-carbon steel container, evacuated, sealed, and gas-pressure bonded at the conditions mentioned above. After bonding was completed, the can and tooling were removed by leaching in nitric acid. The columbium is unaffected by nitric acid so this provides a simple and inexpensive method of tooling removal.

High-Temperature Heater Component

Fig. 19 shows a component of a high-temperature hydrogen furnace. This component was designed to operate at 2500° C. The specific design requirements necessitated the use of a rhenium tube to be structurally bonded to a heavy tungsten back-up collar. The OD of the rhenium and ID of the