yields, products, and mechanical performance of the equipment before a planned extensive shut-down to clean and inspect the equipment, to replace defective instrument tubing, and to make instrument improvements.

Other activities carried on during the testing period included the redipping of 108,000 pounds of spent catalyst for use in manufacturing hydrogen. Additional equipment was activated to produce enough charcoal-molybdenum catalyst for the initial run of the liquid-phase-hydrogenation system.

After many attempts and revisions in equipment design, the coal-preparation plant was tested and accepted. A dried and pulverized coal suitable for hydrogenation was produced. The conception of operating conditions required for drying the coal had to be changed. A low-oxygen-content circulating inert gas was used at a relatively low temperature in place of hot flue gases.

The paste-preparation equipment was tested and found satisfactory, supplying coal paste of the desired consistency.

The heavy-oil let-down (H.O.L.D.) recovery equipment (see fig. 13) was given an extensive break-in period while new operators were being trained for this phase of the operations. The flash-distillation unit (see fig. 14) was operated under simulated conditions, since no H.O.L.D. was available. The centrifuges were tested with a diluted coal-paste mixture. All equipment in the heavy-oil area was activated by transferring oils through the area.

After the liquid-phase coal tar-coal paste run was completed on December 6, the unit was shut down for cleaning, necessary repairs, and changes, and for receiving an additional supply of tar oil and Rock Springs coal for the first prolonged coal-hydrogenation run.

Considerable planning and engineering work was done looking toward future plant improvements, and the major items of this work are summarized as follows:

The 10,000-pound-per-square-inch paste-injection pump was completely redesigned, incorporating all the features deemed necessary as a result of demonstration-plant and German experience in this rugged service.

A shell and tube cooler was designed to be substituted for the double-tube unit acting as the final cooler of the hot catchpot overhead stream. This is a new application for this type of unit and if proved satisfactory will effect a large saving in full-scale plant design.

A combination fractionator catchpot is being worked on to permit elimination of pressure let-down between liquid- and vapor-phase sections of the hydrogenation plant.

An expansion machine was designed to utilize the energy of pressure let-down from the 10,000-pound-per-square-inch level and thereby eliminate the heavy erosive action caused by the expansion of gas, liquid, and solid mixtures from the hot catchpot bottoms.

Gas-Synthesis Demonstration Plant (figs. 15 and 16)

Oxygen Plant

Construction and Testing

Early in 1949 the Linde-Frankl oxygen plant (see fig. 17) construction was substantially completed, and the equipment was subjected to preliminary tests and trial