DESIGN FOR A MULTI-TUBULAR FURNACE FOR PYROLITIC DECOMPOSITIONS

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ABSTRACT

Difficulties have been experienced in the past with pyrolyses of crude raw materials like sawdust, coal, gray acetate of lime and other bulky mixtures.

The principal obstacles are two — the insulating properties of the material and the low yield of certain desired products. If an iron retort is used, heat penetration is slow and four or five hours are required for the decomposition of the charge. If decomposition is carried out in a single tube to facilitate heat penetration, capacity is sacrificed and the amount of product collected for any one run is small.

To obviate these difficulties, a multi-tubular furnace was designed in these laboratories, since a commercial source could not be located.

The straight tubes carrying the charge are supported in the furnace near their ends. The tubes are connected by U bends to form a continuous circuit having the effect of a very long tube by which capacity is gained. Since each tube is only about an inch in outside diameter, heat can readily penetrate to the center of the charge. The general appearance of the furnace with the removable tubes in place is that of a multi-tubular horizontal steam boiler.

The furnace was designed to be heated by three high capacity burners similar to the well known Fisher high temperature type.

A work sheet showing the construction of the furnace and giving dimensions is appended as is a photograph (Fig. 1) to show the general appearance of the apparatus.

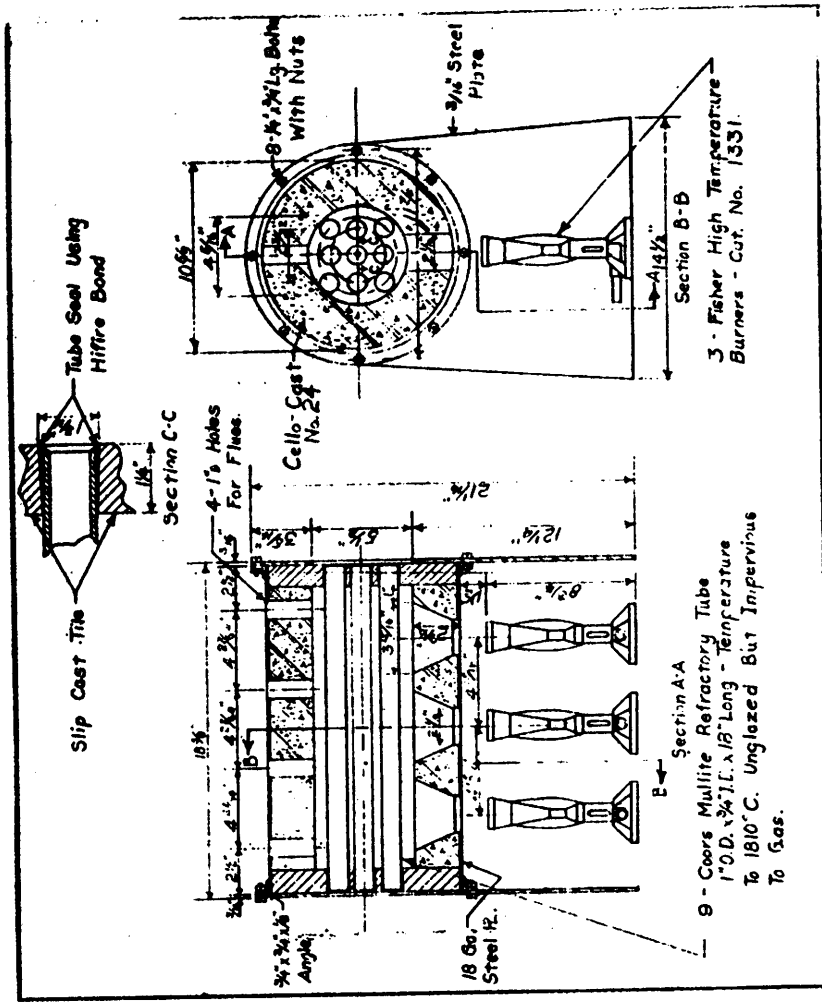

FIGURE 2. Work Sheet

The connection between the tubes and U bends is somewhat of a problem. One solution is to have the tubes and U bends of the same diameter joined end to end over an inner glass tube upon which both rest. The juncture is rendered gas tight by a rubber tube sleeve of Gooch tubing reinforced by a wrapping of electrician's tape.

The pyrolysis of crude gray acetate of lime was carried out in this type of apparatus. It required fifty minutes to exhaust the charge, against a reported four to five hours when a retort is used. The removal of residue from the tubes and subsequent recharge was accomplished in 30 to 45 minutes.