

degree, still continue. With still further improvement in the regulation of heating it is believed that wiping chains will prove absolutely satisfactory, as even under adverse conditions they operate with a considerable degree of efficiency.

The chains originally used were too light for the most satisfactory results and heavier chains are being installed. The chains are readily obtainable in the market and their attachment or removal is a simple matter. Experience with the single-tube furnaces has shown that under proper operating conditions stirring rods will last for an indefinite period. The initial cost of these rods, including the chains, is about \$50 each.

In the multiple-tube furnaces, especially during the periods when excessive heating occurred so frequently, the rods occasionally manifested a tendency to soften and buckle. This difficulty, however, has been totally absent in the case of unit-tube construction.

#### GENERAL CONCLUSIONS CONCERNING CARBON REMOVAL.

The use of a rotating rod with wiping chains attached has demonstrated that it will keep the walls of the tubes free from carbon. With the improvements in the construction of this rod which experience has shown to be advisable, and with uniform heat control, it is believed that this type of cleaner can be used with satisfactory results. The great objection, however, to any cleaning device which is permanently retained in the cracking chamber is the fact that although it can be made to clean the walls of the tube there are no means for cleaning it. It is only a question of time, therefore, which in this case means days, before the amount of carbon built up is such as to necessitate the removal and cleaning of the device. Therefore, from a purely mechanical standpoint, a type of cleaner which is not to be permanently retained in the reaction chamber would be more satisfactory, if it cleaned the walls of the chamber equally well. It is entirely possible that a type of plunger cleaner will be found to accomplish this result and obviate the fundamental objection to the use of any intermittent cleaning device, which is the difficulty in obtaining a continuous oil feed and maintaining uniform conditions of operation. But a plunger cleaner head would be more costly to install and would necessitate detachment whenever a tube was to be removed or its condition examined. Likewise the advantages that accrue from throwing the gases against the walls of the tube would, of course, be largely lost with plungers.

#### CARBON POTS AND TAR NECKS.

The tar neck, so-called, is shown in figure 44. It is attached to the bottom of the tube by a flanged head, which is bolted to the corresponding flange attached to the tube. The fixed and the con-