This invention relates to guides for excavating devices and is an improvement upon the invention of Butler P. Crittenden and Alvin C. Killinger, shown and described in their copending application for excavating devices filed October 1, 1926, Serial No. 138,878. The excavating devices of said application are primarily adapted for use in removing compacted masses of coke or accumulated carbon from the soaking drums of petroleum cracking apparatus or other tanks or overhead containers, and comprise in general a borer or crown drill mounted upon a rotatable shaft axially movable through an opening at the bottom of the container, a thrust bearing for the shaft mounted beneath the container and means for rotating and axially propelling the shaft within the container, whereby the drill or cutter bores a substantially cylindrical hole through the residual mass in the container or soaking drum. In some cases irregularities of hardness of the mass of coke result in considerable lateral pressures on the boring shaft leading to eccentric displacement of this boring head.

A principal object of the present invention is to provide means to avoid such displacement of the boring head, and for this to provide guide means within the container for centering the boring shaft and boring head during its excavating operation. Further objects are to provide a construction for and mode of operation of guiding means competent to hold the boring head to rotation on the central axis of the container. This leads to capacity to bore a hole in the coke mass in the container of larger diameter, compared with the diameter of the container, than is expedient when the bore may become eccentric.

A preferred embodiment of the invention is illustrated in the accompanying drawings, in which

Fig. 1 is a vertical section of a soaking drum showing the parts in normal position prior to the insertion of the excavating device within the drum;

Fig. 2 is an enlarged detail view, partly in section, of a centering spider for the bottom end of a guide rod; and

Fig. 3 is a view similar to Fig. 1 but showing the excavating shaft and boring head in operating position.

The guiding device preferably consists of an elongate rod 4 extending longitudinally within the container, such as a soaking drum 5, and supported at the top of the container by a bracket as for example the three-legged spider 6, suspended at or fixed within the upper outlet of the drum. Preferably the rod 4 is slideable through the spider 6 and is suspended therewithin by a collar 7, bolted or otherwise fastened to the rod, the lower end of the rod hanging within the bottom outlet of the drum.

A removable centering attachment is provided for the rod end 8, comprising a collar 9 carrying preferably three spacing arms 10, one of said arms being pivoted at 11 to a stud 12 of the collar. The three arms normally extend horizontally with their outer ends meeting the walls of the drum mouth. In such position the inner end of the pivoted arm 9, which is beveled downwardly as shown in Fig. 2, extends through a longitudinal slot 13 in the collar and engages an annular recess 14 of the rod 4, as at 15. By tilting said arm upwardly, as to the dotted line position in Fig. 2, the collar may readily be detached from the rod 4 when desired and withdrawn from the drum.

As set forth in said copending application, Serial No. 138,878, the boring head 16 mounted on the rotatable shaft 17 may comprise folding radial cutters 18, permitting the head to be inserted within the bottom mouth of the drum. For the purpose of the present invention, the head 16 and shaft 17 may be tubular, having an axial bore at 19, so that when in operating position (Fig. 3) the guide rod 4 is received within the tubular head 16 and the shaft 17 (the centering attachment 9, 10 having been removed).

During use of the drum 5, as in the petroleum cracking process, the guide rod occupies the normal position illustrated in Fig. 1, the top spider 6 and bottom centering device supporting the rod 4 along the longitudinal axis of the soaking drum. When the drum has been substantially filled with coke or other residue and it is desired to remove the same by the excavator, the top and bottom caps of the drum are removed, the centering device is detached from the lower end of rod 4 and the shaft and boring head, with the hinged cutters folded together are inserted within the lower mouth of the drum. The rod 4 is received within the apertured head and shaft, and if the solid charge in the
drum is such as to endanger deflection of head 16 and shaft 17, may be relied upon to guide the boring head during its ascent through the drum 5.

I claim:

1. In combination with a container and an excavating device having an axially apertured boring head for removing solids from the container, and a tubular shaft for rotating and propelling the boring head through the container, a guide rod mounted in one end of the axis of the container and extending therethrough, said rod entering the apertured head and tubular shaft to center and guide the boring head during the excavating operation.

2. In combination with an upright container and an excavating device having an axially apertured boring head for removing solids from the container and a tubular shaft for rotating and propelling the boring head through the container, a guide rod suspended from the top of the container and extending downwardly therethrough, said rod being adapted to enter and guide the boring head and shaft during an excavating operation.

3. In combination with an upright container and an excavating device having an axially apertured boring head for removing solids from the container and a tubular shaft for rotating and propelling the boring head through the container, a guide rod suspended from the top of the container and extending downwardly therethrough, said rod being adapted to enter and guide the boring head and shaft during an excavating operation.

Signed by me at 30 Beacham St., Everett, Mass., this Fourteenth day of January, 1927.

HAROLD L. BOLTON.