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ADJUSTABLE MULTIPLE DRILL

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FIG. 1.

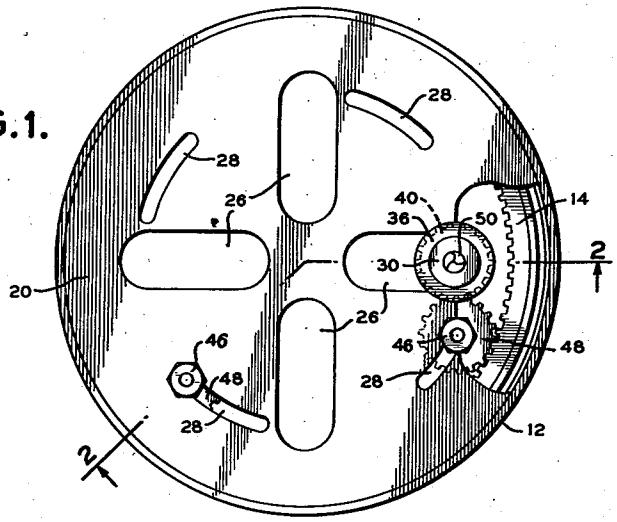


FIG. 2.

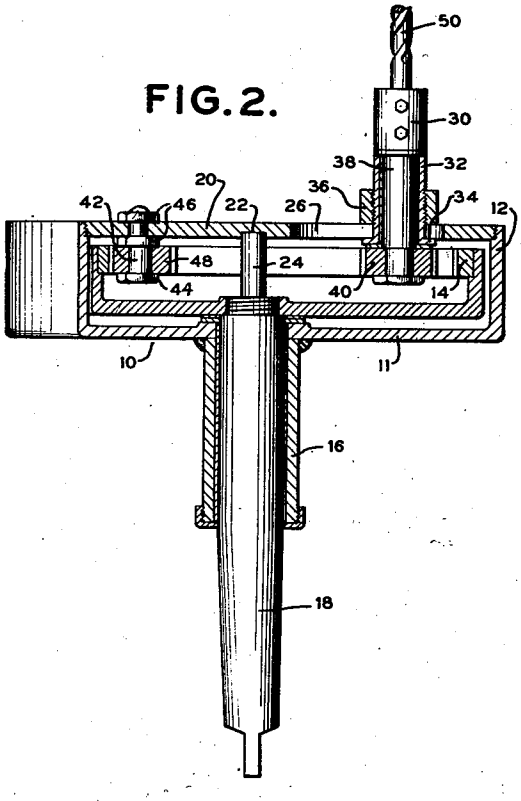
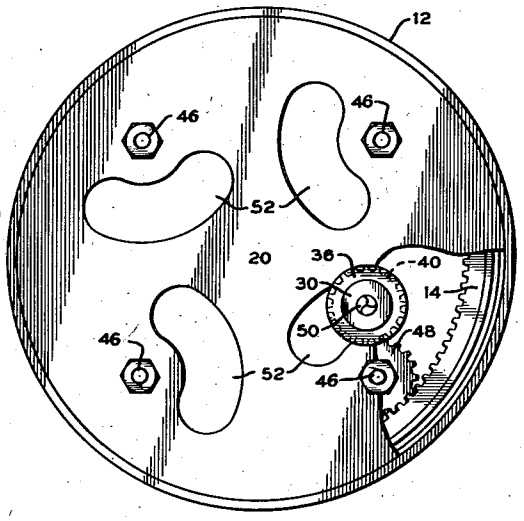


FIG. 3.



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ADJUSTABLE MULTIPLE DRILL

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1 Claim. (Cl. 77—23)

This invention relates to multiple drills and more particularly, to an adjustable multiple drill of a type suitable for use in cleaning heat exchanger tubes by drilling the coke or scale from the interiors of several tubes simultaneously. The principal object of the invention is the provision of a device of this type in which the spacing of the drills can be adjusted, so that the device can be used with heat exchangers having different spacing of the tubes.

It is not uncommon to use a drill having several bits rotatable simultaneously in the cleaning of heat exchanger tubes, such as those used in the treatment of hydrocarbon oils, but since the tubes in the various makes and types of heat exchangers are often spaced at different distances, it has been necessary heretofore to keep several multiple drills having different drill bit spacing on hand in order to fit the several types of heat exchangers.

In accordance with this invention, a plurality of drill bit chucks are mounted on a plate forming a cover for a gear housing in such a manner that they may be pre-adjusted radially or otherwise on the plate so as to fit a certain tube spacing while, at the same time, the driving connection from a central source is maintained. A single gear mounted within the housing and driven from a suitable source serves to drive a plurality of idler pinions which mesh with pinions on the several drill chucks, and the arrangement is such that when the drill chucks are adjusted to various positions on the plate the gear connection between the driving gear and the several drill chucks will be continuously maintained.

For a better understanding of the invention reference may be had to the accompanying drawing in which:

Figure 1 is a front elevation of the multiple drill housing showing a part of the cover plate broken away;

Figure 2 is a sectional elevation taken on the line 2—2 of Figure 1, looking in the direction of the arrows; while

Figure 3 is an elevation somewhat similar to Figure 1, but illustrating a modified form of the invention.

Referring to the drawing, a casing 10 having a disc portion 11 and a flange portion 12 has journalled therein an annular ring gear 14. The disc portion 11 of the housing is preferably provided with a sleeve-like extension 16 this extension serving as a bearing for a drive shaft 18 journalled therein and attached to the ring gear 14. A cover plate 20 is adapted to be secured as by a threaded connection to the outer edge of the flange portion 12 of the housing and is provided at its center with an indentation 22 serving as a bearing for an extension 24 of the drive shaft 18. The cover plate 20 has formed therein a plurality of radial slots 26 and an equal number of arc-shaped slots 28 formed concentrically of the cover plate 20.

A drill chuck 30 journalled in a sleeve bearing 32 and having a flanged head 34 is mounted in each of the radial slots 26 and a suitable nut 36 having a threaded connection with the sleeve 32 serves to secure the chuck in any desired position in its respective slot 26. The shaft 38 of the drill chuck has secured at its inner end a pinion gear 40. A bearing 42 comprising a bolt 44 and a pair of nuts 46 is adjustably mounted in each of the slots 28 and on each bearing 42 is mounted an idler pinion 48 adapted to mesh with the teeth of the ring gear 14. By loosening the nuts 46 each bearing 42 can be adjusted circumferentially in its respective slot 28. Although but one drill chuck 30 and drill 50 have been shown in the drawing, it is understood that as many drills will be used as there are slots 26 in the cover plate. Likewise, for purposes of simplicity but two bearings 42 and idler pinion gears 48 have been illustrated.

In operation, the tube spacing of the particular heat exchanger to be cleaned is measured, and the nuts 36 on the drill chucks are loosened so that the chucks can be adjusted in their slots 26 so that the drill spacing will correspond to the spacing of the tubes of the heat exchanger. The bearings 42 of the idler pinion gears are then loosened, and the idler gears moved circumferentially so that they will remain in contact with both the ring gear 14 and their respective pinion gears 40. In this manner, rotation of the drive shaft 18 may be transmitted to all of the drill chucks and, if the adjustments are properly made, the device can be used for simultaneously cleaning several tubes of a heat exchanger or other device.

In the modification shown in Figure 3, the operation is somewhat the same as that previously described with reference to Figures 1 and 2, and the same reference characters have been used where possible. However, in this type, the cover plate 20 does not have any circumferential slots for the idler pinions but rather is provided with a plurality of drill chuck slots 52, each being formed in an arc concentric with one of the idler pinions 48. In this type, it is necessary merely to adjust the drill chucks 32

in their respective slots in order to vary the spacing of the several drills.

The invention is not limited to the cleaning of tubes since the drill may, obviously, be used in drilling simultaneously a plurality of holes having selective spacing in any desired article.

It is understood that various other modifications may be made in the means for carrying out the invention by those skilled in the art without departing from the spirit of the invention as defined in the appended claim.

We claim:

In a multiple drill, an annular drum shaped casing comprising a disc portion and a peripheral flange formed on said disc portion, a cover plate adapted to be attached to said flange, said cover plate having a series of radial slots formed therein, a sleeve bearing adjustably mounted in each of said slots, a drill chuck journalled in each of said sleeve bearings, a pinion gear on the inner end of each chuck, said cover plate being provided with a second series of slots, said second series of slots being formed on a circle concentric with respect to said annular casing, a bearing adjustably mounted in each slot of said second series, an idler pinion gear journalled in each of said bearings, means for rotating said chucks comprising an annular ring gear in said casing and meshing with all of said idler gears, and a drive shaft for said ring gear, the arrangement being such that when said sleeve bearings are adjusted longitudinally of their radial slots each of said idler gear bearings may be adjusted in its respective concentric slot so that each idler gear will be continuously in mesh with said ring gear and with one of said pinion gears.

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