Feb. 7, 1928.

A. H. SWARTZ ET AL

1,658,617

TUBE CLEANER

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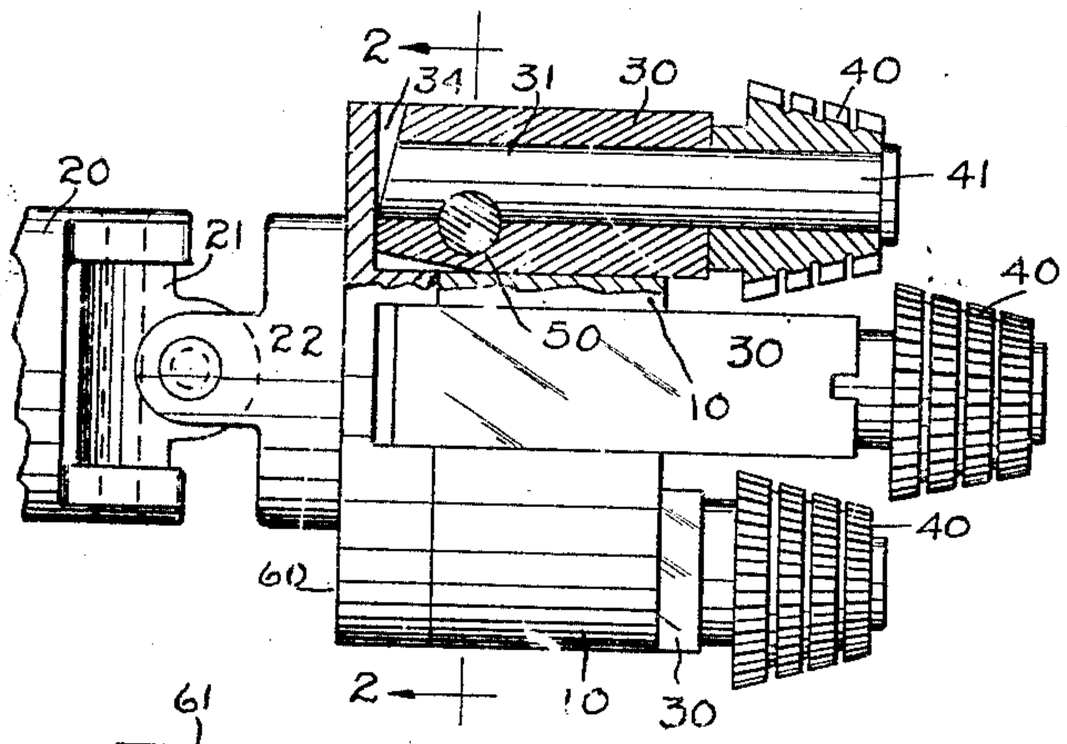


FIG.- 1

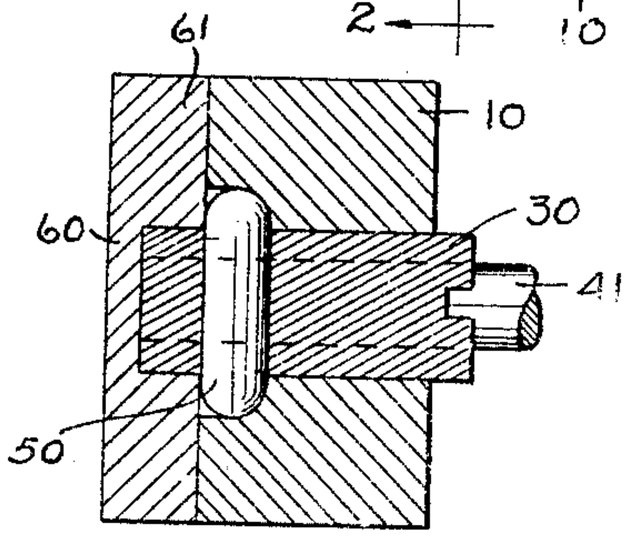
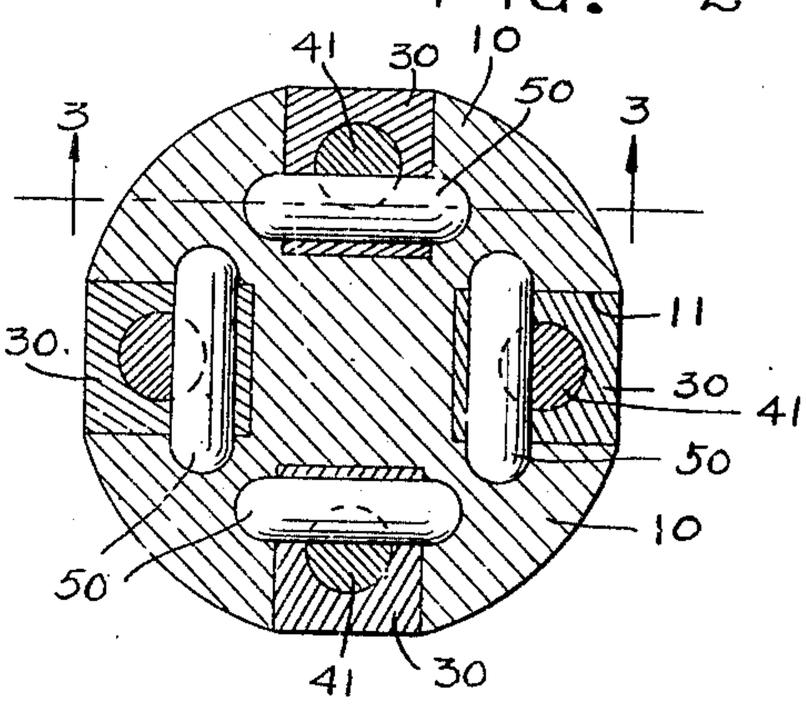


FIG.- 3

FIG.- 2



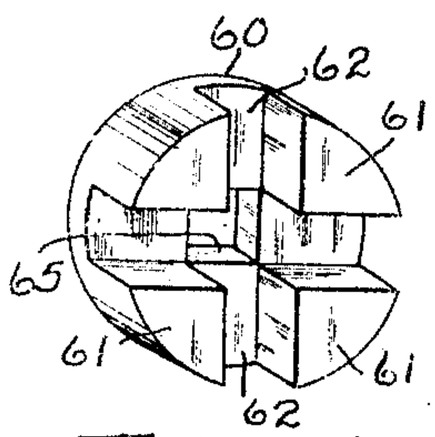


FIG.- 4

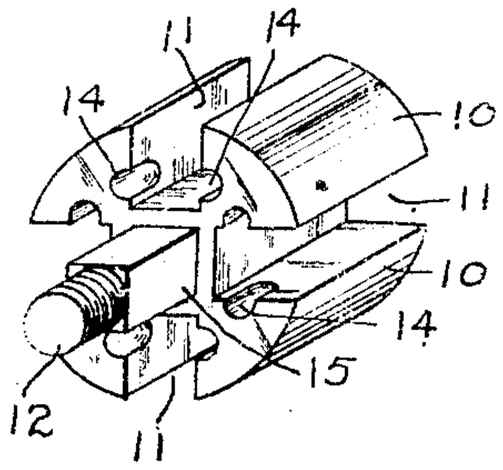


FIG.- 5

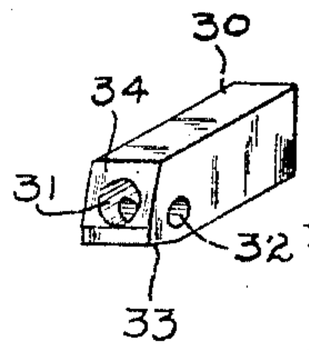


FIG.- 6

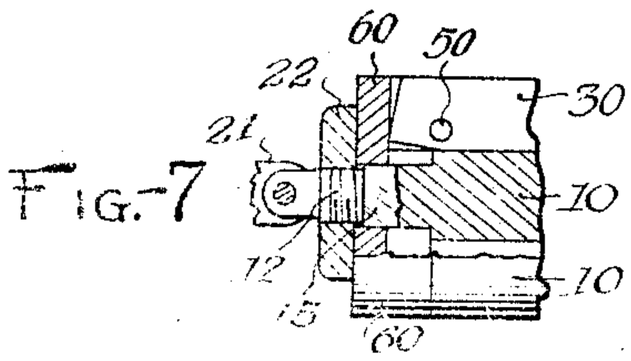


FIG.- 7

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UNITED STATES PATENT OFFICE.

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TUBE CLEANER.

Application filed May 26, 1927. Serial No. 194,357.

This invention relates to boiler tube cleaners of the type which have a rotating head carrying pivoted arms which are thrown out by centrifugal force to bring cutters carried by the arms against encrustation in the interior of the tube. Such cleaners have been on the market for a long time and are effective to cut out the encrustation in the tube, but experience has demonstrated that both the cutters themselves and the arms frequently break, requiring replacement of used parts. An object of the present invention is to provide the device in a form which will enable this replacement to be effected with a minimum of labor and skill.

Economical original construction and durability in use are also objects of the invention. The invention is illustrated in the drawings hereof, and is hereinafter more fully explained with reference to such drawings, and the essential novel features are summarized in the claims.

In the drawings, Fig. 1 is a sectional side elevation of our cleaner; Fig. 2 is a cross section through the pivots of the arms, as indicated by the line 2—2 on Fig. 1; Fig. 3 is a sectional view through the pivot of an arm at right angles to Fig. 2 as illustrated by the line 3—3 on Fig. 2; Fig. 4 is a perspective of the rotary clamping cap; Fig. 5 is a perspective of the rotary head or body; Fig. 6 is a perspective of one of the arms, and fig 7 is a detail in central longitudinal section parallel with Fig. 1.

As shown in Figs. 1, 2 and 5, the body of the device comprises a substantially cylindrical barrel 10, having a plurality of radially extending parallel sided grooves 11, four of these grooves being shown. Extending from one end of this body is a threaded stud 12 to which the driving connection may be attached. This driving connection ordinarily includes a universal joint indicated at 20, 21 and 22 in Fig. 1. In such case, the member 22 has a threaded bore to receive the stud 12 of the head 10.

The pivoted arms which carry the cutters are pivotally mounted in the grooves 11 near the attached end of the head in a manner which is an important part of our invention and will now be described.

Each cutter designated 40 is rotatably journaled on a stud 41, which extends into a cylindrical bore 31 in the arm 30. The stud is locked in the arm by a transverse pin 50, which extends through the arm, occupying aligned holes 32 therein and a substantially semi-cylindrical recess in the stud. These same pins 50 furnish the means of pivotally connecting the arms to the head. To this end we provide recesses 14 in the body of the head on opposite sides of each slot 11, adjacent the attached end of the head and the projecting portions of the pin 50 on opposite sides of the arm occupying these recesses. The recesses have a total depth (lengthwise of the head) only slightly greater than the diameter of the pin 50. It thus results that pins are not only journaled in the recesses, so as to be rotatable therein, but have their outermost portions substantially flush with the end surface of the head, so that the pins may be retained in place by a cap extending straight across the end of the head over the recesses.

It will be seen that the construction described in the last paragraph not only enables the cutter with its supporting stud to be readily connected to the arm and disconnected therefrom, by shoving the pin 50 in or out, but this same pin by simply occupying the end opening recesses furnishes the pivots for the arms. It is only necessary therefore, to provide a convenient stop member engaging the outer side of the pins to hold the parts properly assembled. The stop member referred to comprises the cap 60 having a number of inwardly facing bosses 61 separated by grooves 62. There are as many of these grooves as there are grooves 11 in the body, and they are of the same transverse dimension and location, so that when the cap is placed against the body, the grooves 62 provide further space for the operation of the arm 30 while the bosses 61 abutting the pins 50 hold them in place.

The cap 60 surrounds the stud 12, and

is held on the body by the driven member 22 of the universal joint referred to, which abuts the cap. To prevent rotation of the cap independently of the body we may form a square boss 15 on the body, which occupies a square central hole in the center of the cap.

It will be noticed that the projecting end portions of the pivot pins 50 are made hemispherical. This enables their easy insertion in the openings 32 in the arms, these pins having an easy sliding fit through the arms and across the studs so that they may be inserted or removed without special tools. The recesses 14 are semi-cylindrical for a depth about equal to one-half the diameter of the pin and then terminate in a surface which is a quarter sphere. This provides a proper bearing for the hemispherical end of the pin. It is also a form of groove which may be readily milled in the head.

The inner faces of the arms 30 beyond the region of the pivot pins are chamfered as at 33, and the outer ends of the arms are also cut off diagonally, as at 34, to provide space for enabling the arm to swing outwardly in use.

It will be seen that our device involves comparatively few parts and may be readily constructed, and is very easy of assemblage. This latter is a particularly important point, for with the frequent breakage of such tools, ready separation of parts and their re-assemblage is essential. This is ordinarily done in locations where there is considerable dirt, that is, adjacent the boiler being cleaned, and it is important that there be no small parts to become lost in such dirt. It is also important the repairs may be made by comparatively unskilled labor, and without special tools.

With our device, when breakage occurs, it is simply necessary to unscrew the head from the driving universal joint, remove the cap, then remove the broken arm or the arm carrying the broken cutter, a fresh arm being then supplied, or a fresh cutter, as the case may be. The latter is conveniently connected to the arm by inserting a pin 30 and then the assembled arm, cutter, stud and pin are simply placed in the proper slot 11, with the projecting ends of the pin 50 in the recesses 14, and then the cap plate returned and the universal joint screwed into the place.

We claim:

1. A tool of the character described, comprising a rotary grooved body, arms adapted to occupy the grooves of the body and having projecting pivot pins, recesses in the body on opposite sides of the grooves leading from one end of the body and of a depth substantially the same as the diameter of the pivot pins, and a cap held on the body and abutting the end of the body, and extending across the ends of the recesses to engage the pivot pins.

2. In a tool of the character described, the combination of a body having longitudinal grooves parallel with its axis, cutter carrying arms occupying said grooves, pivot pins extending through these arms, some distance from the inner ends, said pins extending beyond the sides of the arms and occupying recesses in opposite sides of the groove, which recesses lead to the end of the head, and a cap having bosses engaging the end of the body and overlapping the recesses, said cap having grooves between its bosses registering with the grooves of the body and adapted to receive the portion of the arms beyond the pivot pins.

3. In a device of the character described, the combination of a rotary head having a plurality of longitudinal grooves, each groove having in opposite sides adjacent one end of the body a recess leading inwardly, hollow arms, cutters, studs carrying the cutters and occupying bores of the arms, projecting pins occupying recesses in the studs and locking the studs to the arms and furnishing means for pivoting the arms to the body, said pins being adapted to occupy said recesses, the recesses being of such depth that when the pins are in place therein they are substantially tangent to the plane of the end of the body, a cap having grooves therein corresponding in size and position to those of the body, said grooves having flat-faced bosses between them, the grooves of the cap furnishing space for the inner ends of the arms while the bosses of the cap hold the pivot pins in place in the body recesses.

4. In a tool of the character described, the combination of a body having a groove with recesses in its opposite sides leading a short distance inwardly from the end of the body, said grooves being rounded laterally, a hollow arm occupying the groove and having a laterally projecting pivot pin extending therethrough with rounded ends occupying the recesses, a cutter beyond the end of the arm, a stud carrying the cutter and occupying the bore of the arm and having a transverse recess which the pin occupies, the arm extending beyond the end of the body, and a cap having a groove to receive the projecting portion of the arm and abutting portions to engage the end of the body over the ends of the recesses and thereby hold the pivot pins in place.

5. In a tool of the character described, the combination of a rotary head having a slotted body, arms adapted to occupy the slots of the body and having projecting pivot pins with hemispherical ends, semi-cylindrical recesses in the body on opposite sides of the slots leading from one end of the body and terminating in rounded ends

at a distance from the end of the body substantially the same as the diameter of the pivot pins, a cap having bosses abutting the ends of the body and engaging the pivot pins to hold them in the recesses, said cap having grooves between its bosses registering with the grooves of the body and adapted to receive the portion of the arm beyond the pivot pin, a threaded stud on the body projecting through the cap, and a driving connection engaging said stud.

In testimony whereof, we hereunto affix our signatures.

ALFRED H. SWARTZ.
DOUGLAS S. TUCKER.