W. S. ELLIOTT.

TUBE CLEANER.

APPLICATION FILED OCT. 14, 1908.

928,432.

Patented July 20, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

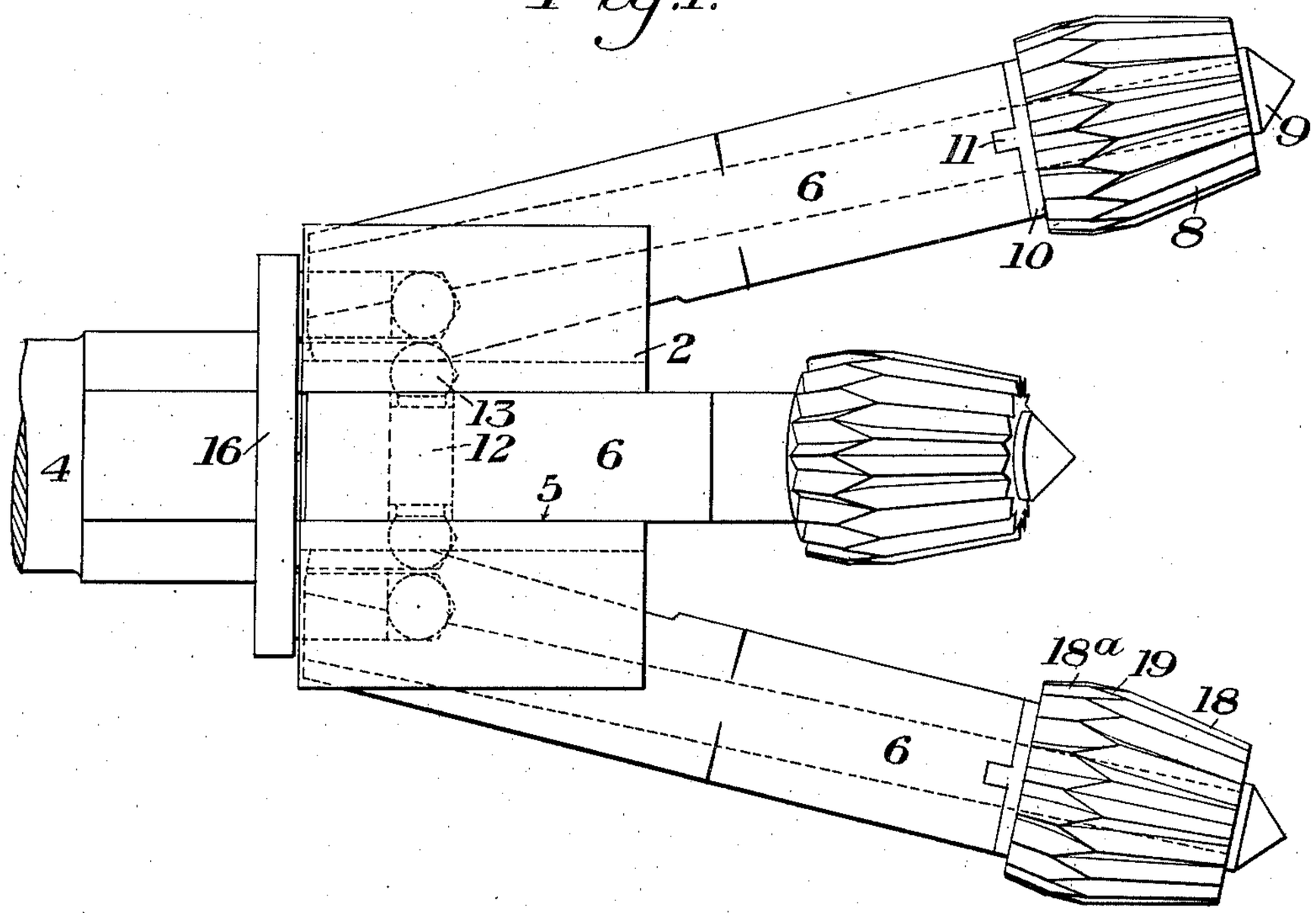
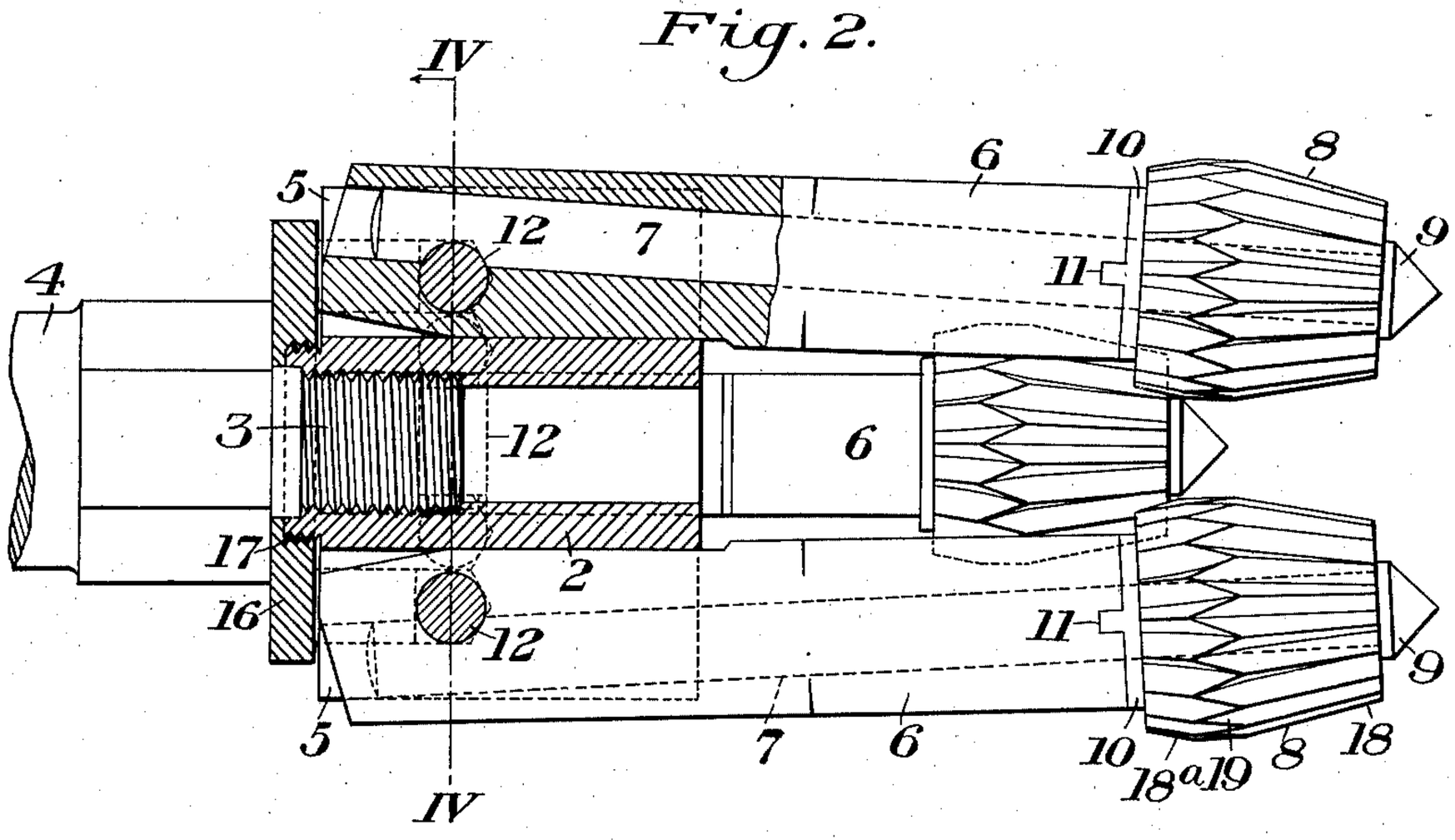


Fig. 2.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3.

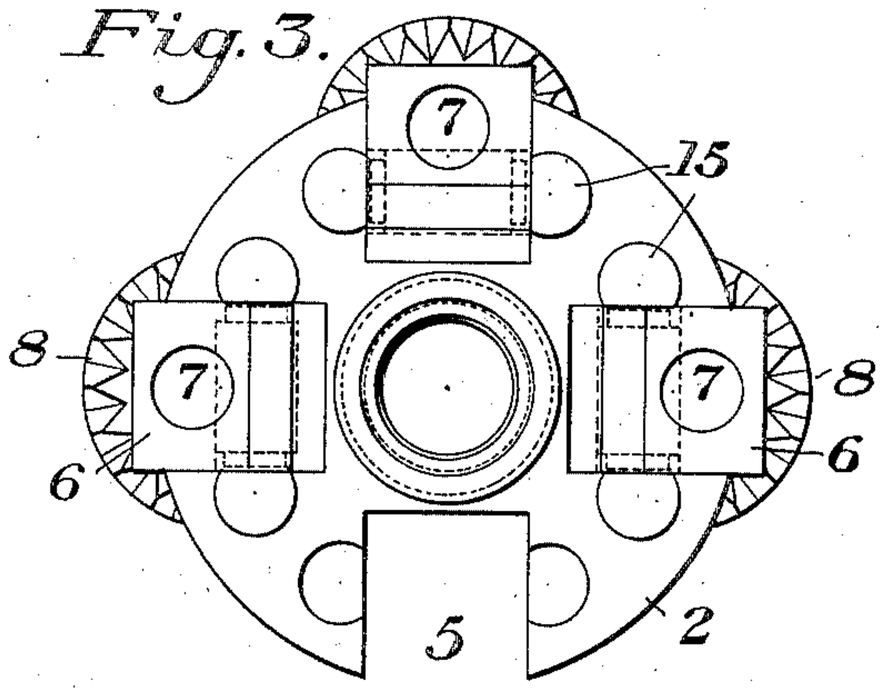


Fig. 4.

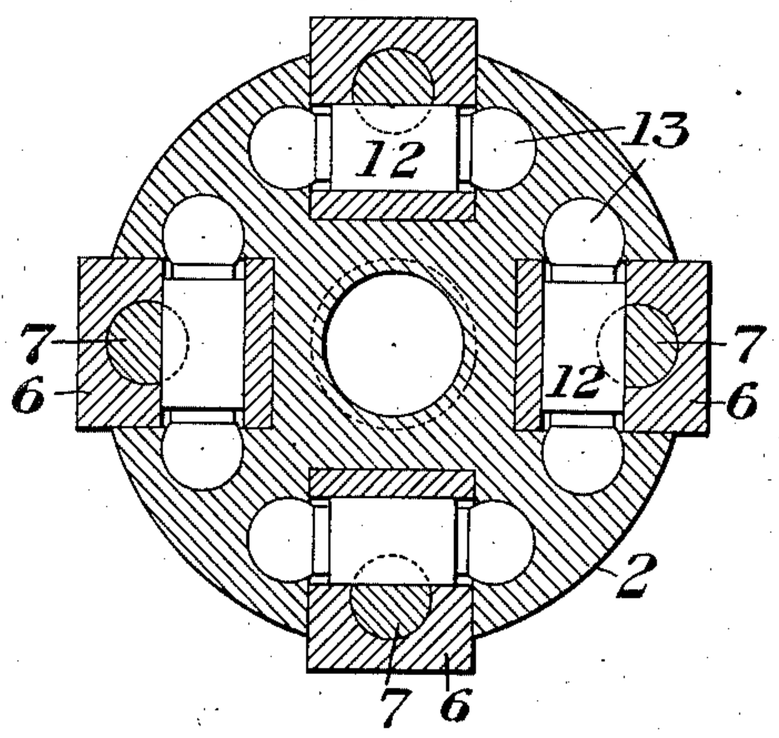


Fig. 5.

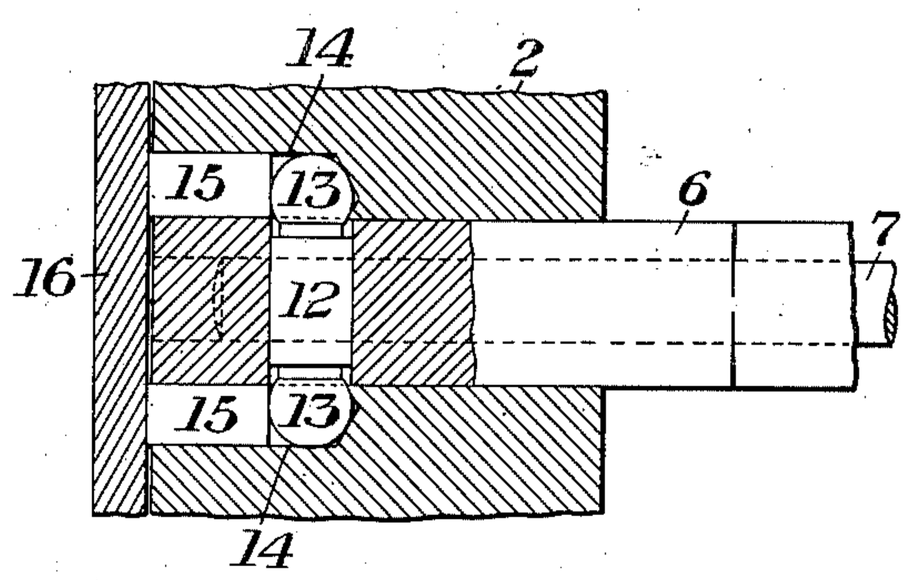


Fig. 6.

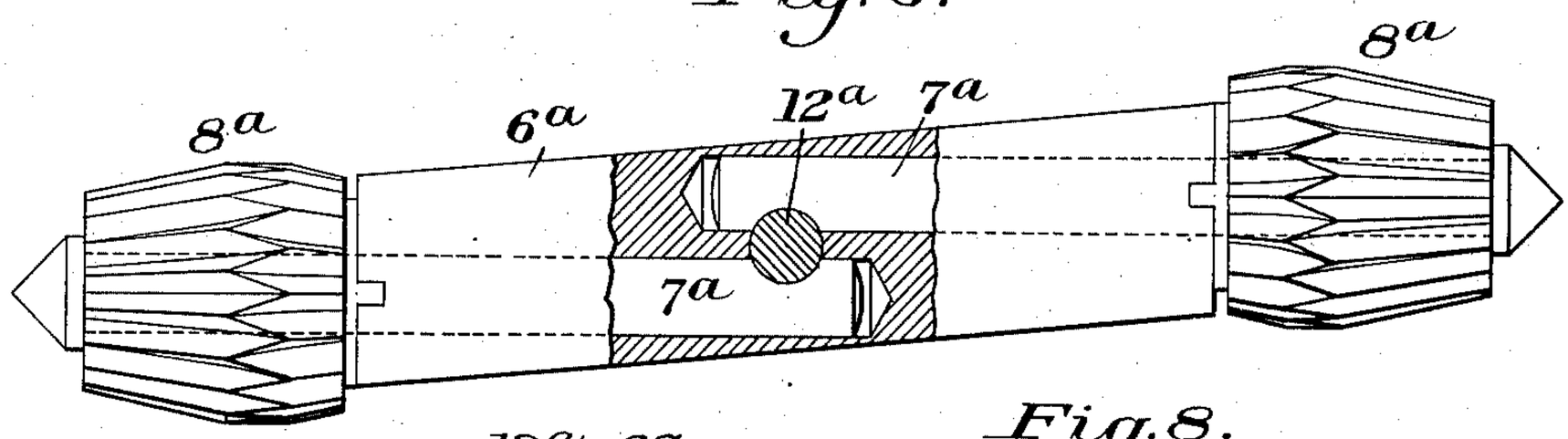


Fig. 7.

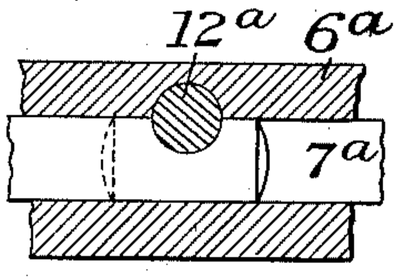
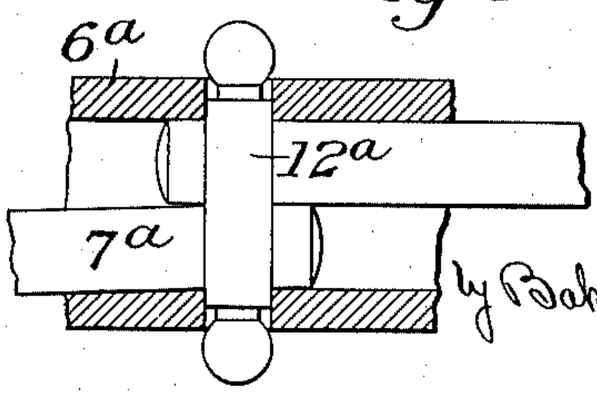


Fig. 8.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM S. ELLIOTT, OF PITTSBURG, PENNSYLVANIA.

TUBE-CLEANER.

No. 928,432. Specification of Letters Patent. Patented July 20, 1909.

Application filed October 14, 1908. Serial No. 457,658.

To all whom it may concern:

Be it known that I, WILLIAM S. ELLIOTT, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Tube-Cleaner, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of one form of cleaner embodying my invention, with the cleaner arms in their extreme outward position; Fig. 2 is a side view of the same partly in section showing the arms closed; Fig. 3 is an end view with one of the cutter carrying arms removed; Fig. 4 is a section on the line IV—IV of Fig. 2; Fig. 5 is a detail sectional view; and Fig. 6 is a view partly in side elevation and partly in section, of a modified form of one of the cleaner arms; Figs. 7 and 8 are detail views of another modification.

My invention has relation to boiler tube cleaners, and is designed to provide a simple and efficient form of cleaner for this purpose.

More specific objects of my invention are to provide a cleaner head in which the parts are free from rivet connections, and which are so constructed and secured as to permit any portion of the head to be quickly removed and replaced when necessary; and also to provide an improved form of cutter in which tracking is prevented.

The nature of my invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various changes may be made in the details of construction and arrangement without departing from the spirit and scope of my invention as defined in the appended claims.

Referring to the accompanying drawings, the numeral 2 designates the body of the head, which is provided with a central screw-threaded socket 3, or with any other suitable means for the attachment thereto of a carrying or driving shaft 4. The head is also provided with a plurality of radial longitudinal slots 5, in which the cleaner arms 6 are pivotally seated. Each of these arms is provided with a longitudinal bore or aperture extending therethrough to receive a pin or shaft 7, these pins or shafts projecting from the forward ends of the arms to form journals for the cutter wheels 8. The wheels 8 are rotatably mounted on these journals between the heads 9 at the forward ends of the pins or shafts, and washers 10 seated between the rear ends of the wheels and the forward ends of the arms. To prevent rotation of these washers they are locked to the arms in any suitable manner, as by the lugs or projections 11 engaging corresponding recesses in the end portions of the arms. The pins or shafts 7 are removably secured in the arms by means of the transverse pins 12 engaging recesses or depressions in the shafts 7, and also forming the trunnions or pivots for the arms, these pins having the ball-shaped heads 13 which seat in bearings 14 at opposite sides of each arm. To form these bearings the head is bored out from its rear end at each side of the slots 5, and after the pins 13 have been seated, removable plugs 15 are placed in these bores, in the manner clearly shown in Fig. 5, the inner ends of these plugs seating against the ball heads 13 of the pins. To hold these pins in place and prevent any forward and back play of the pins and arms, a plate 16 is seated against the rear end of the head, being preferably screw-threaded thereon as indicated at 17 in Fig. 2, there being sufficient looseness in these screw threads so that when the end of the shaft 4 is screwed home in the socket 3, this plate 16 will be forced tightly against the ends of the plugs 15 and thereby secured in place.

The cutter wheels 8 are of novel character, in that they are provided with two sets of longitudinally extending cutting edges 18 and 18ª, in staggered or alternating relation to each other, the two sets being connected by the oblique cutting edges 19. The cutters preferably have a cone taper in both directions from the oblique cutting edges 19, the latter being at that portion of the cutter which has the greatest diameter. The cutting edges 19 act as cross-cutters, while the cutting edges 18ª give a staggered or cleaning cut, these several cutting portions effectively preventing any tracking of the cutter wheels. The double tapered form of the cutter wheels facilitates their insertion into and feeding action within the tubes, and also facilitates their withdrawal from the tubes.

By unscrewing the head from the shaft 4, and then unscrewing the plate 16, the plugs 15 can be removed, thereby allowing any arm to be quickly taken out of the head. The pin 7 can then be readily removed from the arms, and the cutter wheels removed and

renewed. This manner of constructing and assembling the parts, whereby all the rivet connections are dispensed with, constitutes an important feature of my invention, since it permits the ready renewal and replacement of any of the cutter wheels or of any arm which may become broken. I do not limit myself, however, to the precise means for securing this result which I have herein shown and described, since the details thereof may obviously be changed.

In Fig. 6 I have shown a double form of arm 6^a, which is designed to be centrally pivoted with any suitable head by a pin or trunnion 12^a of similar form to the pins or trunnions 12 before described. The arm is longitudinally bored in opposite directions to receive the pins or shafts 7^a, each of which carries a cutter wheel 8^a at its outer end. The bores for the two pins or shafts 7^a are inclined sufficiently to bring the inner ends of said rods or shafts at opposite sides of the pin or trunnion whereby the latter serves to secure them both in place. The two rods or shafts may, however, be both on the same side of the pin, as shown in Figs. 7 and 8.

In the form of head shown in Figs. 1 and 2, there are four of the arms 6, two of these arms being shorter than the other two arms in order to cut in a different circular path. I do not, however, limit myself to any particular number or arrangements of the arms, since any desired number of arms, either of the same or varying lengths, may be employed.

What I claim is:—

1. A cutter for tube cleaners, comprising an integral body having thereon two series of longitudinally extending cutting edges, the cutting edges of the two series being in staggered relation to each other, and the cutting edges of one series being connected to the adjacent cutting edges of the other series by oblique cross-cutting edges, said cutter being mounted for free rotation; substantially as described.

2. A cutter wheel for tube cleaners, comprising a wheel having a cone taper toward each end and provided with two sets of longitudinally extending cutting edges in alternating or staggered relation to each other, and oblique cross-cutting edges connecting the two series of longitudinal cutting edges; substantially as described.

3. A cutter wheel for tube cleaners, comprising a wheel having a cone taper toward each end and provided with two sets of longitudinally extending cutting edges in alternating or staggered relation to each other, and oblique cross-cutting edges connecting the two series of longitudinal cutting edges, and located at that portion of the wheel of greatest diameter; substantially as described.

4. In a boiler tube cleaner, a head, an arm seated in said head and provided with laterally projecting pivots or trunnions engaging seats in the heads said seats being open at their rear ends, and means for closing said seats; substantially as described.

5. In a boiler tube cleaner, a head provided with a longitudinal radial slot, having longitudinally extending bearing recesses at opposite sides thereof, a cutter-carrying arm engaging said slot and having a transversely extending pivot pin whose ends bear in the said recesses, and separate means for normally preventing longitudinal movement of the pivot pins in said recesses; substantially as described.

6. In a boiler tube cleaner, a head, an arm pivoted to said head, a rod or shaft extending longitudinally into said arm, said arm having a pin or pivot which engages the rod or shaft and thereby secures it in the arm, and a cutter wheel journaled on said rod or shaft; substantially as described.

7. In a boiler tube cleaner, a head provided with a longitudinal radial slot, having longitudinally extending bearing recesses at opposite sides thereof, a cutter carrying arm engaging said slot and having a transversely extending pivot pin whose ends bear in the said recesses, and removable plugs inserted in said recesses from their open rear ends and normally holding the pin or pivot against longitudinal movement; substantially as described.

8. In a boiler tube cleaner, a head formed with a plurality of longitudinal radial slots, each of which has bearing recesses on opposite sides thereof, cutter carrying arms seated in the said slots and having transversely extending pivots which bear in said recesses, removable filling members inserted in said recesses from the open rear ends thereof, and a retaining member adjacent to the rear ends of the filling members; substantially as described.

9. In a tube cleaner, a pivoted arm, a headed rod or shaft extending into said arm, a pivot for the arm, said pivot also engaging and securing the rod or shaft in the arm, said pivot being removable to release said rod or shaft, and a cutter wheel journaled on the forward end of said rod or shaft between its head and the forward end of the arm; substantially as described.

10. In a tube cleaner, a centrally pivoted cutter carrying arm, a separately removable rod or shaft extending into each end portion of said arm, a cutter wheel journaled on the outer end portion of each rod or shaft at opposite ends of the arm, and a pivot pin or trunnion for said arm engaging both said rods or shafts and normally securing them in place; substantially as described.

11. In a boiler tube cleaner, a head having a plurality of longitudinal radial slots therein, said slots each having pivot seats at opposite sides thereof, said seats extending to, and

opening at, the rear end of the head, a cutter-carrying arm in each of said slots, a transversely extending pivot pin for each of said arms, said pin extending into said seats at its ends, removable retaining means for normally preventing movement of the pivots in said seats, and removable cutter-carrying rods or shafts removably inserted in said arms and having recesses therein engaged by the pivot pins, substantially as described.

In testimony whereof, I have hereunto set my hand.

WILLIAM S. ELLIOTT.

Witnesses:
GEO. B. BLEMING,
H. M. CORWIN.