Dec. 17, 1935. V. H. BAKER 2,025,009

TUBE CLEANER

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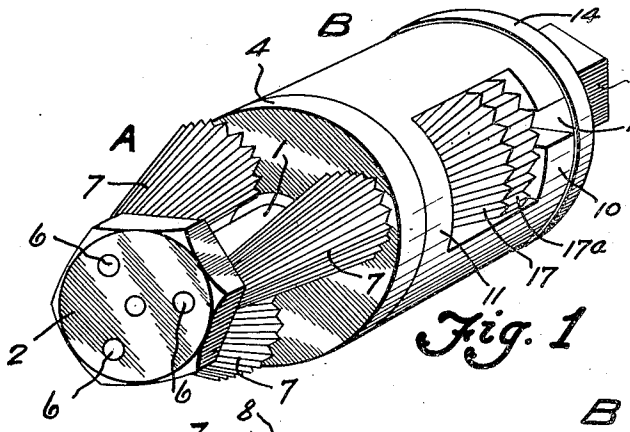

Fig. 1

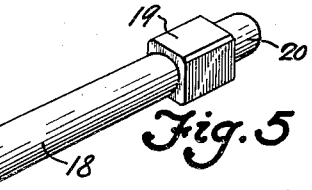

Fig. 5

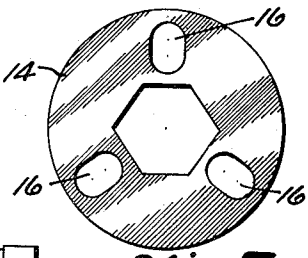

Fig. 7

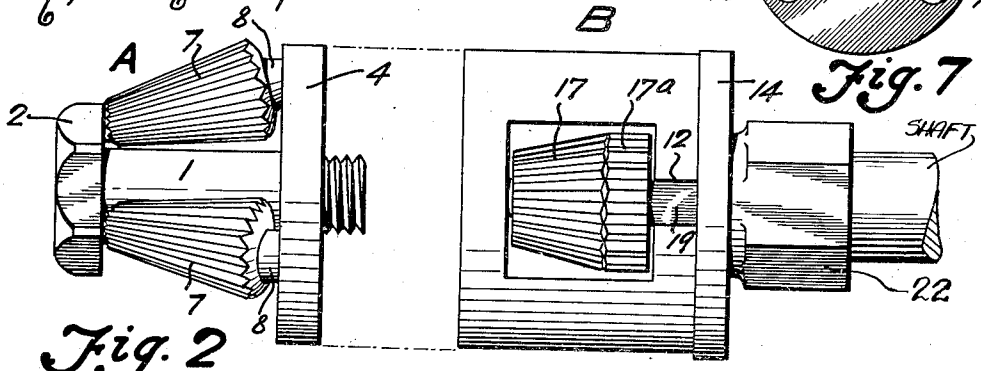

Fig. 2

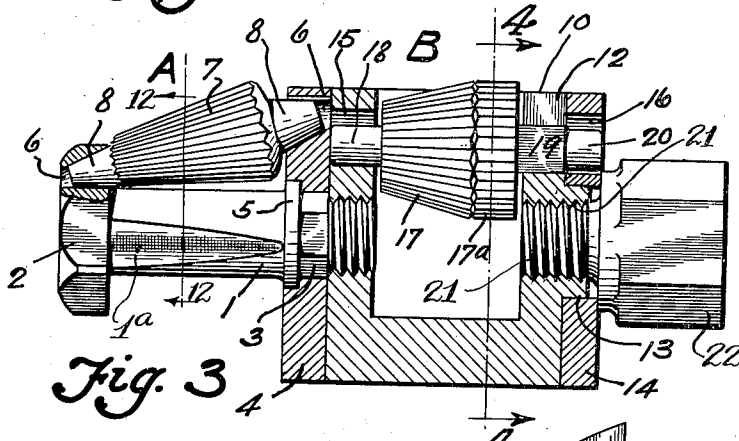

Fig. 3

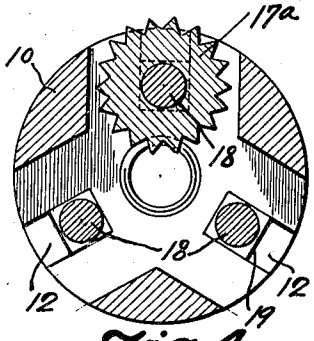

Fig. 4

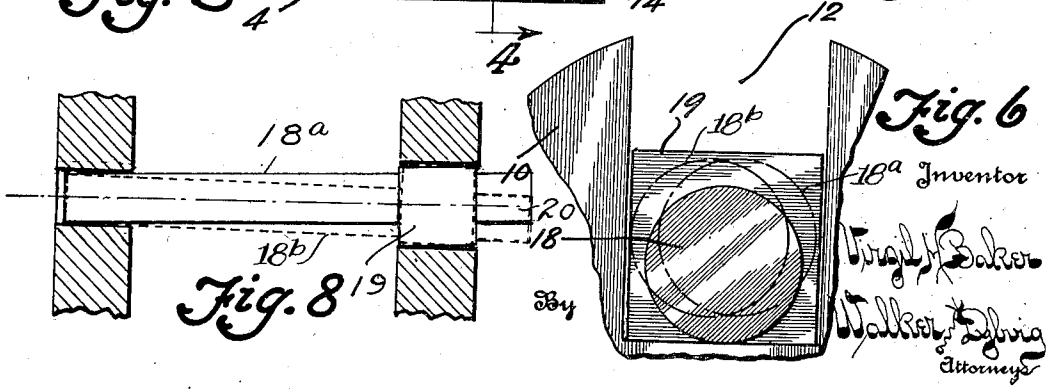

Fig. 8

Fig. 6

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TUBE CLEANER

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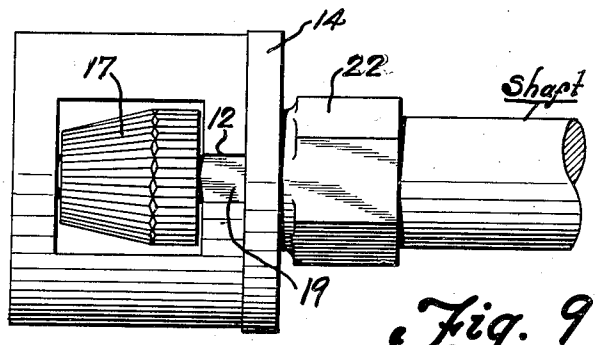

Fig. 9

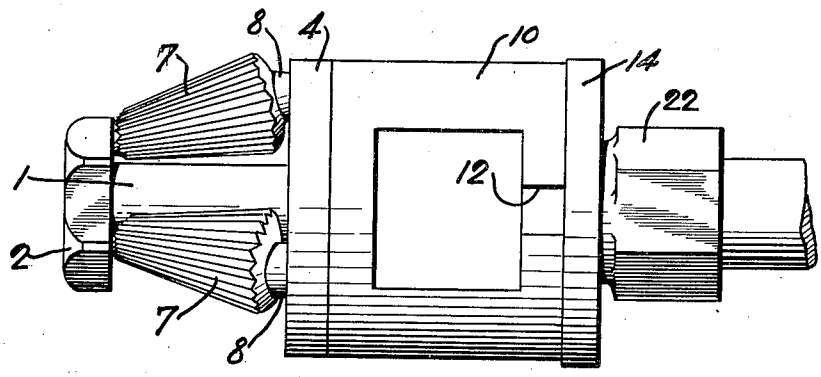

Fig. 10

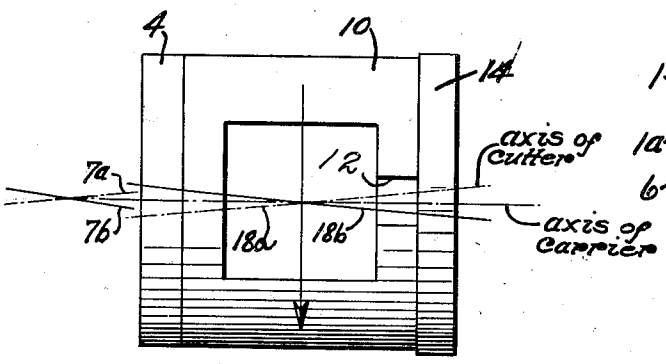

Fig. 11

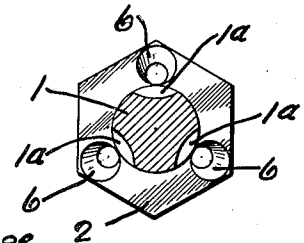

Fig. 12

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UNITED STATES PATENT OFFICE

2,025,009

TUBE CLEANER

Virgil H. Baker, Springfield, Ohio, assignor to The Lagonda Manufacturing Company, Springfield, Ohio, a corporation of Ohio

Application October 28, 1933, Serial No. 695,639

9 Claims. (Cl. 15—104.13)

The invention pertains to mechanical tube and pipe cleaners of the gyratory type and more particularly to a sectional cutter head comprising separable units and an improved method of mounting the cutter elements therein.

The present tube cleaner is capable of a wide range of industrial applications not only in heat exchange apparatus but in other tube and pipe installations. Due to chemical reaction and precipitation of solid matter entrained in flowing liquids, the tubes of boilers, stills, condensers and evaporators become encrusted with scale and deposit of extreme hardness which clogs such passages, reducing their capacities and thermally insulating the walls. Water and other pipes are likewise subject to corrosion and deposits of solid matter which retards flow and increases pump resistance.

The present device is adapted to remove such objectionable deposits by mechanical action wherein the scale and encrustation is disintegrated and dislodged by the cutting and abrading action of hardened rotary cutting elements carried in a rotary head in such manner that they progressively attack the deposits and automatically accommodate themselves to changing contour and size of the encrusted interior of the tube and to deflections and curvatures thereof.

The present cutter head comprises in advance roughing cutter unit wherein cutter elements are mounted in converging relation for rotation about fixed axes and a finishing cutter unit wherein the cutters are mounted on floating axes for automatic adjustment under centrifugal influence to compensate for the progressive enlargement of the bore of the tube due to removal of deposit. These units are usable conjointly or singly as may be required by the character and extent of the deposit to be removed. The axes of the floating cutters of the finishing unit when in position of adjustment are inclined to the axis of rotation of the head but not in the same plane, thereby giving to the head a slightly helical characteristic affording a screw effect by which automatic feeding action is achieved. The longitudinally inclined cutters of the roughing unit, also preferably though not necessarily, are set in a slightly askew relation with the axis of the head. Such inclination of the cutters of either unit is ordinarily approximately but two degrees out of axial alignment but obviously may be more or less, according to conditions of operation. The mounting trunnions of such cutters are provided with peripheral enlargements of polygonal form, by which their axial displacement is prevented without interference with their radial shifting motion, and enabling the use of trunnions of maximum hardness without being subject to undue breakage.

The object of the invention is to simplify the construction as well as the means and mode of operation of gyratory tube cleaners whereby they may not only be economically manufactured, but will be more efficient in use, automatic in operation, of increased durability, easily operated and unlikely to get out of repair.

A further object of the invention is to provide a cutter head of marked simplicity, having but few parts, and those parts of relatively large size, with no small parts to be easily lost, and capable of easy and "fool-proof" assembly.

A further and important object of the invention is to provide a device of great flexibility and applicable to widely varying operating conditions by forming the device which may be used as a single entity for unison operation or part of which may be used independently of the remainder, as the character of the work may necessitate.

A further object of the invention is to provide an improved form of cutter pin or trunnion shaft and to enable the retention of the maximum strength of the trunnion shafts for the cutters by providing peripheral enlargements which not only serve as bearings but have thrust engagement to prevent axial displacement of such trunnions and obviate the necessity of reducing the sections of the shafts by flattening and thereby weakening them.

A further object of the invention is to dispose the cutters in such relation as to minimize resistance to advance movement and induce an automatic feeding action.

A further but none the less important feature of the invention is to provide for changing the inclination of the cutter pin or trunnion relative to the carrying head to vary or reverse the feeding action.

A further object of the invention is to provide an improved floating mounting for planetary cutter elements enabling their automatic adjustment into effective relation with the work.

A further object of the invention is to increase the period of usefulness of the cutter trunnions, by enabling them to be presented in successive positions of rotative adjustment whereby the wear thereon may be uniformly distributed.

A further object of the invention is to provide a cutter head for a tube cleaner having the herein mentioned desirable characteristics.

With the above primary and other incidental

objects in view, as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation, or their equivalents, as hereinafter described and set forth in the claims.

In the drawings wherein is shown the preferred, but obviously not necessarily the only form of embodiment of the inenvtion, Fig. 1 is a perspective view of the assembled cutter head. Fig. 2 is a side elevation showing the roughing and finishing units separated from each other. Fig. 3 is a longitudinal sectional view. Fig. 4 is a transverse sectional view. Fig. 5 is a detail perspective view of one of the cutter trunnion shafts. Fig. 6 is a detail view of the structure shown in Figs. 1 to 4 and illustrates a fragmentary end view of Fig. 8. Fig. 7 is a detail view of an abutment plate. Fig. 8 is a diagrammatic plan view of Fig. 6 illustrating the relative adjustments of the cutter pin to a quite exaggerated degree. Figs. 9 and 10 show a finishing cutter and a roughing cutter respectively as used alone. Fig. 11 is a diagrammatic view illustrating the angularity of the cutters. Fig. 12 is a sectional view taken substantially on line 12—12 of Fig. 3.

Like parts are indicated by similar characters of reference throughout the several views.

Rotary cutter heads for removing scale and other deposits from tubes and pipes are quite old in the art. Such devices are progressively advanced through a clogged or encrusted pipe or tube and are rotated by a suitable air or steam motor either directly connected and following the cutter head through the tube or stationarily mounted outside the tube and operatively connected with the advancing cutter head by an extendible drive shaft. The scale, or coke, to be removed from the interior of tubes and pipes varies greatly in character, degree of hardness and depth of deposit. Many times a relatively thin deposit, of "egg-shell" character is found to be extremely hard. Such thin deposit being beyond the range of operation of the roughing unit, the finishing and burnishing unit alone is effective, and in the present construction the roughing unit may be detached, thus relieving the load on the motor and reducing the weight of the apparatus, especially when it is suspended in a vertical tube. While cutter heads having tapered pilot portions and body portions of larger diameter provided with floating cutters have been heretofore used such heads have been of inseparable or unitary character, heavy and cumbersome, and unadaptable to universal use, and the cutter trunnions have usually been laterally notched or flattened to fit their mounting, and hence materially weakened, necessitating trunnion shafts of relatively large diameter. By providing separable cutter head units, forming the subject matter hereof, one designed for heavy or roughing service and the other for finishing and smoothing or burnishing action, which may be connected with the actuating motor independently of the roughing cutter with which it may be also interconnected for unison operation, the device is given universal character and made applicable to a much wider variety of work, and further when the burnishing or finishing unit alone is used less power is required for operation. Whereas the flattening of the cutter trunnions heretofore for engagement in the mounting materially weakened the shaft or pin resulting in excessive breakage, the polygonal enlargement of the trunnion shafts at their points of engagement with the mounting materially strengthens these pins and serves duo-functionally to afford non-rotative sliding lateral engagement of the trunnion shaft with its mounting in any one of several positions of rotative adjustment, and to limit the shafts against axial displacement without the necessity of auxiliary detachable fastening devices. By disposing the axes of the cylindrical bodies of the pin slightly eccentric or off center relative to the polygonal enlargements, the relation of the axes of the pins or trunnion shafts to the axis of rotation of the head may be changed to different inclinations and in different planes or aligned with the axis of the head to thereby vary the self-feeding effect, or neutralizing such tendency as conditions dictate as will appear more fully later. It is desirable when operating in vertical tubes to reverse the inclination of the cutters so that they will possess a tendency to feed backward, and thus to some extent oppose gravity influence and counteract the weight of the suspended cutter head, driving motor and supply hose, which together are relatively heavy.

The roughing cutter unit A includes a spool-like rotary carrier or mounting comprising a core or shaft 1 laterally concaved or grooved at 1—*a* to accommodate the roughing cutters and having a relatively small integral head 2 at the end. The opposite end of the core is formed with a polygonal shoulder 3 to receive a removeable disc or head 4 of greater diameter, having a polygonal central opening fitting the shoulder 3, and which abuts against a collar 5 on the core or shaft portion 1 receivable within a recessed seat in the face of such disc or head 4.

The respective heads 2 and 4 of the mounting are provided with tapered bearing seats 6 to receive the trunnions of a series of planetary roughing cutters 7 which are carried by the mounting in converging relation to each other and inclined to the axis of rotation. The bearing seats 6 for the cutter trunnions on one head are preferably though not necessarily slightly offset in the direction of rotation relative to the bearing seats in the other head whereby the roughing cutters 7 are slightly inclined relative to the direction of rotation of the head B but not in the plane thereof. This rotative inclination is ordinarily but two or three degrees from a position normal to the plane of rotation, but obviously may be varied according to different conditions of operation and variations of the character of the deposit to be removed. If 18 is so positioned, that is the center position disclosed in Fig. 6, as to have the cutter axially aligned with the axis of the carrier if one of the pins does wear it might be rotated through one hundred eighty degrees so as to present the other side of the pin for wear to be equalized. Now let it be assumed that the cutter is positioned so the pin is offset to the right as disclosed in Fig. 6 and let it be assumed that the carrier rotates in a counterclockwise direction. The pin wears. It is found desirable to equalize the wear by rotating member 18 through one hundred eighty degrees and reverse the direction of rotation of the carrier so as to cause it to rotate in a clockwise direction. The wear is equalized. This may be clearly seen by referring to the disclosure shown in Figs. 6, 8 and schematically in Fig. 11.

At its rear end the core or shaft portion of the mounting extends beyond the removable head 4 and is screw threaded for detachable engagement

with the finishing or burnishing cutter unit or with other driving means as may be desired.

The finishing or burnishing cutter unit includes a carrier or mounting of cage-like form having relatively spaced heads 10 and 11 integrally interconnected by convex wall portions forming a substantially cylindrical hollow body having flat ends and provided with peripheral openings to receive the cutter elements. The rear head 10 is provided with radial rectangular slots 12 intersecting the periphery of the head and a central polygonal hub 13 to receive a complementary removable abutment plate 14 having a central polygonal orifice to receive the hub 13 and also provided with radially elongated holes or slots 15 registering with the open end slots 12 of the head 10 when the plate 14 is in position. The opposite head 11 of the mounting cage is provided with radially elongated holes or slots 16 corresponding with the slots 15 of the abutment plate 14.

Located within the peripheral openings or pockets of the carrier are independently revoluble cutter elements 17 and 17—*a* which may be of various shapes or sizes and of different surface configuration. Those shown for illustrative purpose comprise cylindrical serrated cutters 17—*a* and fluted conical cutters 17 assembled in pairs. These cutters, whether multiple or single, are mounted for floating motion radially under centrifugal influence within the limits of the slots 15 and 16, and are of such length as to conform rather loosely to the space intermediate the heads 10 and 11 between which they are confined. The gyratory finishing and burnishing cutters 17 and 17*a* are mounted on trunnion shafts or cutter pins 18 for rotation about their own axes simultaneously with their rotation about the axis of the cutter head. Heretofore it has been the practice to flatten the trunnion shafts or cutter pins on one or both sides for engagement in the mounting head. For longevity and effective service it is quite desirable that these cutter pins be hardened. The indentation of the sides of the pins as heretofore practiced materially weakened the structure and there has been frequent breakage at such points.

Contrary to such former practice, instead of reducing the pins or shafts at their points of engagement with the mounting, the pins are materially enlarged and strengthened at such points.

In the present instance the cutter pins 18 are provided with polygonal enlargements 19 which slidingly engage in the radial slots 12 of the mounting for bodily movement of the trunnion pins and cutters mounted thereon in radial directions under centrifugal influence. These peripheral enlargements 19 are duo-functional and not only materially increase the strength of the pins at their points of engagement with the carrier and provide improved sliding bearing surfaces thereon, but they also provide thrust bearings or abutment shoulders to limit the axial displacement of the pins. The polygonal form of the pin bearings enables the pins to be reengaged from time to time in different positions of rotative adjustment to equalize the wear thereon and increase their period of usefulness. Being of increased section at their bearing points at which breakage has heretofore usually occurred the cylindrical bodies of the pins may be of less diameter without sacrificing strength. The cutter elements 17 and 17—*a*, or such other types of cutters as may be substituted therefor, are assembled on the pins, and the smaller ends of the pins are projected into the slots or elongated holes 16 in the head 11, while the polygonal enlargements 19 engage within the radial slots 12 of the head 10.

In such relation the forward ends of the cutters having clearance to permit axial movement may abut upon the inner face of the head 11 of the carrier, and the shoulders afforded at the forward sides of the polygonal enlargements 19 may abut upon the rear ends of the cutters to limit the axial movement of the cutter in one direction. The pins 18 are provided with reduced terminals 20 beyond the peripheral enlargements 19, which extend within the radial slots 16 of the abutment plate 14, to limit the radial movement of the pin with respect to the axis of rotation of the cutter head. The cutter pins or trunnion shafts 18 and with them the cutters 17 and 17—*a* mounted thereon are free for radial floating motion within the limits of the slots 15 and 16, while the pins are held against rotary motion by the engagement of their polygonal enlargements 19 within the slots 12, and at the same time are held against axial displacement by the abutment of the same peripheral enlargements in one direction upon the ends of the cutters and in the opposite direction upon the complementary abutment plate 14.

The pin receiving slots of the respective heads 10 and 11 of the rotary carrier or mounting may be longitudinally aligned with each other but are preferably slightly offset in the direction of rotation of the head whereby the axes of the respective cutter pins are disposed slightly askew or inclined relative to the direction of rotation. Such inclination is usually approximately two degrees, but may be more or less to meet particular conditions of use.

In the event that such pins having eccentric bearing enlargements are disposed in longitudinally aligned slots 12, 15 and 16, by adjusting the pins through partial rotative movements the relation of the pins to the rotative carrier may be materially altered. By disposing the pins in the slots 12 with the direction of eccentricity lying in a plane of the axis of rotation of the head or aligned with the slot, the pin is positioned closer to or farther from the axis of rotation, but in longitudinal alignment with the carrier. By a quarter turn of the pin by which the direction of eccentricity of the body and enlargement of the pin is transverse to the radius of the carrier one end of the pin will be deflected laterally independently of the other end of the pin out of longitudinally aligned relation with the mounting into an askew or inclined relation relative to the axis of rotation of the head but not in a plane of the axis of rotation. By turning it in one direction for engagement in the slot 12, it is inclined in one direction and by giving the pin a half turn in reverse direction for reengagement in the slot 12 it is inclined in a contrary direction.

By inclining the axes of the cutters with respect to the axis of rotation of the head but out of the plane of said axis the device is given a screw-like effect which affords an automatic feeding action. Referring to Fig. 11, the axis of the revoluble cutter elements 17 and 17*a* may coincide with the dot-dash line 18*a* and the axis of the cutter 7 along the line 7*a* so as to have a screw-like effect to automatically feed the cutters. If desirable the angle of inclination may be reversed from 18*a* to 18*b* and from 7*a* to 7*b* so as to reverse the direction of the screw thread-like effect, thereby effecting a backward rather than a forward action or vice versa. Instead of reversing both axes, only one may be reversed so that the

screw thread-like effect of one cutter is in part at least counteracted by the screw thread effect of the other. This automotive action may be effected forwardly or backwardly according to the direction of inclination of the cutters. The latter is quite desirable at times when the cutter head is suspended in a substantially vertical tube or pipe in which case the tendency to feed reversely assists in supporting the apparatus and relieves the weight sustained by the operator. The hub of the head 11 of the carrier or mounting is provided with a screw threaded opening for reception of the threaded end 21 of a coupling member 22 by which the cutter head may be attached to a driving motor, or for reception of a threaded end of a drive shaft connected to a remote power device.

The inclination of the axes of the cutters to the direction of rotation of the carrier as used in the specification and claims may be defined as having the axes of the cutters intersecting all planes common to the axis of the carrier.

The roughing cutter unit A and the finishing cutter unit B are usable conjointly, or the roughing cutter may be detached and the finishing unit B alone utilized. This is the customary practice in using the device disclosed. However, if so desired the screw threaded extremity of the roughing cutter may be employed to interconnect the roughing cutter unit directly with the driving power independently of the finishing unit. Thus the combination cutter head is universal in character and capable of a wide range of applications. The improved form of mounting pin obviates the problem of breakage, enables the pins to be adjusted to compensate for wear and by employing eccentrically disposed bearing portions upon the pins the latter are capable of further angular adjustment and also to different spaced relation with the axis of the head. While for illustrative purpose the angularity of the cutter pin 18 has been greatly exaggerated in Fig. 8 it is to be understood that this angularity will ordinarily be approximately two or three degrees and that to accommodate such angular adjustment the slots 12 and 16 may be made with sufficient clearance or "sloppy" fit which in any event would be quite small. The conical roughing cutters 7—7 being mounted on inclined fixed axes in the forward unit A are unyielding when forcibly thrust into operative engagement with the coke deposit or encrustation within a tube and have effective and positive engagement therewith insuring enlargement of the bore sufficiently to permit free passage of the larger rear unit B and the driving motor. If yieldingly mounted or of flexible character such assembly would tend to collapse or contract under the resistance of the coke deposit and consequently the rear unit B and driving motor could not follow into the passage defined by such collapsed roughing unit or would be in danger of becoming wedged therein or would resist rotation due to tightness of their fit. The unyielding relation of the roughing cutters rotating on their fixed axes defining an orbital path slightly larger at all times than the diameter of the burnishing cutter carrier and the motor facilitates uniform operation under pressure or force feed conditions when operating upon heavy coke deposits of hard character. The integral trunnions 8 of the roughing cutters 7 being tapered and engaging in correspondingly tapered seats in the respective mounting heads 2 and 4 not only provide increased strength, but facilitate the assembly of the head by permitting their engagement by an axial movement of the removable head 4 in a direction angular to the fixed axes of the respective cutters, which would not be possible if these trunnions were straight. The taper of the trunnions is upon a degree substantially equal to the convergent angularity of the axes of the cutters, thus disposing the outer sides of the bearing seats in the head 4 and the inner sides of the seats in the head 2 substantially parallel with each other and parallel with the axis of the carrier, whereby the several trunnions are simultaneously engageable in their bearing seats by a straight relative movement of the cutters and heads parallel with the axis of the cutter head.

To protect the bearing seats of the tapered trunnions 8 against excessive thrust pressure, the larger ends of the inclined tapered cutters 7 are chamfered and have thrust engagement against the head 4 outside such bearings, thus limiting the longitudinal play of the cutters and relieving the trunnions and their bearings.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute, the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise the preferred form of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. In a tube cleaner, a rotary carrier, a plurality of planetary cutting elements carried thereby, mounting shafts for said cutting elements, the axis of said shafts being arranged in inclined relation to the axis of rotation of the carrier, but out of a plane of said axis, polygonal enlargements having parallel sides eccentrically mounted upon the mounting shafts near one end, said carrier having radially extending elongated recesses therein in which the polygonal enlargements of the shafts are seated in positions selected from several positions of rotative adjustment, said recesses being elongated radially with respect to the axis of rotation of the head to permit unrestricted limited radial movement of the shafts but not rotative movement thereof and recesses for supporting the ends of the shafts opposite said enlargements, means for supporting the other ends of the shafts permitting a radial movement thereof and means for limiting the outward movement of the shafts.

2. A rotary tube cleaner having a roughing cutter unit and a finishing cutter unit, each including a plurality of planetary cutter elements and mounting shafts therefor extending in the general direction of the axis of rotation of the cutter unit, one shaft for each cutter element, the combination including a head for the finishing cutter unit in which the forward ends of the shafts are exposed and a support for the roughing cutter unit, said support including a disc-like member abutting said head and provided

with bearing seats for supporting the shafts of the cutter elements of the roughing unit and a duo-functional retaining member for interconnecting the two units, said retaining member securing said disc-like member in position and being secured to the head, said retaining member having a forwardly extending portion to support the forwardly extending portion of the roughing cutter shafts.

3. In a rotary tube cleaner, a head provided with a plurality of pairs of aligned and spaced radially extending slots, a plurality of planetary cleaning elements, means for supporting said cleaning elements in said head, said means including a shaft for each cleaning element extending in the general direction of the axis of rotation of the head, each of said shafts having its ends located in one pair of slots and being provided with a rectangular enlargement eccentrically arranged with respect to the axis of the shaft, each of said enlargements being arranged to be seated in one of said slots in a non-rotative position selected from a plurality of positions to thereby obtain a selected angle of inclination of the axis of the shaft with respect to the axis of rotation of the head but out of the plane of the axis of rotation and means engaging the shafts beyond said enlargements for limiting the outward movement thereof by centrifugal force.

4. In a rotary tube cleaner, a head provided with a plurality of pairs of aligned and spaced radially extending seats having parallel sides extending radially, a plurality of planetary cleaning elements, means for supporting said cleaning elements in said head, said means including a shaft for each cleaning element extending in the general direction of the axis of rotation of the head, said shaft being provided with a polygonal enlargement having parallel sides, said enlargement being eccentrically arranged with respect to the axis of the shaft, each of said enlargements being arranged to be non-rotatably seated in one of said seats in a position selected from a plurality of positions to thereby obtain a selected angle of inclination of the axes of the shaft with respect to the axis of rotation of the head, but out of the plane of the axis of rotation, said seats permitting radial movement of the cutters with respect to the axis of rotation, the shaft's end farthest removed from the enlargement being movably mounted in the other seat of the pair including the seat supporting the enlargement and means engaging the ends of the shafts for limiting the radial movement of said cutters.

5. A rotary tube cleaner having a roughing cutter unit and a finishing cutter unit, each including a plurality of planetary cutter elements and mounting shafts therefor extending in the general direction of the axis of rotation of the tube cleaner, one shaft for each cutter element, the combination including a head for the finishing cutter unit in which the forward ends of the shafts are exposed and a support for the roughing cutter unit, said support including a disc-like member abutting said head and provided with bearing seats for supporting the ends of the shafts of the cutter elements of the roughing unit and a dual functional retaining member threadedly engaging the head, said member being provided with a collar abutting said disc-like member to clamp said disc-like member to the cutter head, and having a forwardly extending portion to support the forwardly extending ends of the roughing cutter shafts.

6. In a tube cleaner, a rotary carrier, a planetary cutter, a polygonal block having parallel sides, pivot means for said cutter eccentrically positioned with respect to the center of the polygon and substantially normal to a plane common to the sides thereof, the axis of said pivot means being generally parallel to the axis of rotation of the carrier, said carrier having two spaced substantially radially extending guide walls in which the polygonal block is seated in a position selected from a plurality of positions of rotative adjustment for centrifugal sliding and means to prevent radial and axial displacement of said block and cutter.

7. In a tube cleaner, a rotary carrier, a planetary cutter, a rectangular block, pivot means for said cutter eccentrically positioned with respect to the center of the rectangular block and substantially normal to a plane common to the sides thereof, the axis of said pivot means being generally parallel to the axis of rotation of the carrier, said carrier having a substantially radially extending guide slot in which the block is seated in a position selected from a plurality of positions of rotative adjustment for centrifugal sliding and means to prevent radial and axial displacement of said block and cutter.

8. In a tube cleaner, a rotary carrier, a planetary cutter, a polygonal block having parallel sides and having an integral pivot for said cutter eccentrically positioned with respect to the center of the polygon and substantially normal to a plane common to the sides thereof, the axis of said pivot being generally parallel to the axis of rotation of the carrier, said carrier having a substantially radially extending guide slot in which the polygonal block is seated in a position selected from a plurality of positions of rotative adjustment for centrifugal sliding and means to prevent radial and axial displacement of said block and cutter.

9. A rotary tube cleaner having a roughing cutter unit and a finishing cutter unit, each including a plurality of planetary cutter elements and mounting shafts therefor extending in the general direction of the axis of rotation of the cutter unit, one shaft for each cutter element, the combination including a head for the finishing cutter unit in which the forward ends of the shafts are supported and a support for the roughing cutter unit, said support including a disc-like member abutting said head and provided with bearing seats for supporting the shafts of the cutter elements of the roughing unit and a duo-functional retaining member for interconnecting the two units, said retaining member axially clamping said disc-like member in position and being detachably and rigidly secured to the forward end of the head, said retaining member having a forwardly extending portion to support the forwardly extending portion of the roughing cutter shafts.

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