June 1, 1948. H. H. TALBOYS 2,442,624

INTERNAL GRINDER AND POLISHER

Original Filed Aug. 6, 1943 5 Sheets-Sheet 1

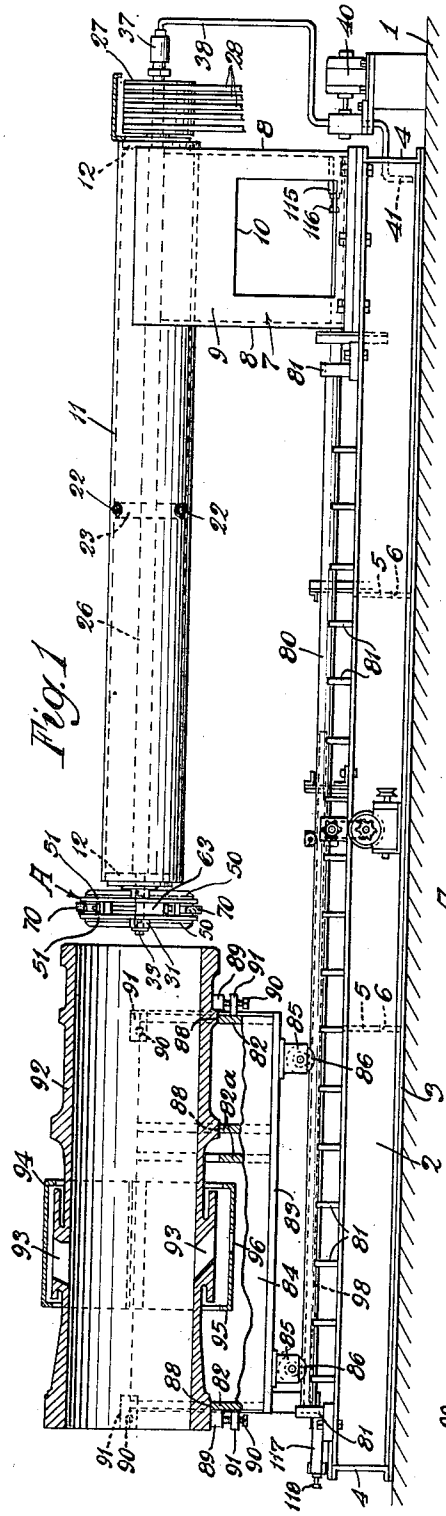


Fig. 1

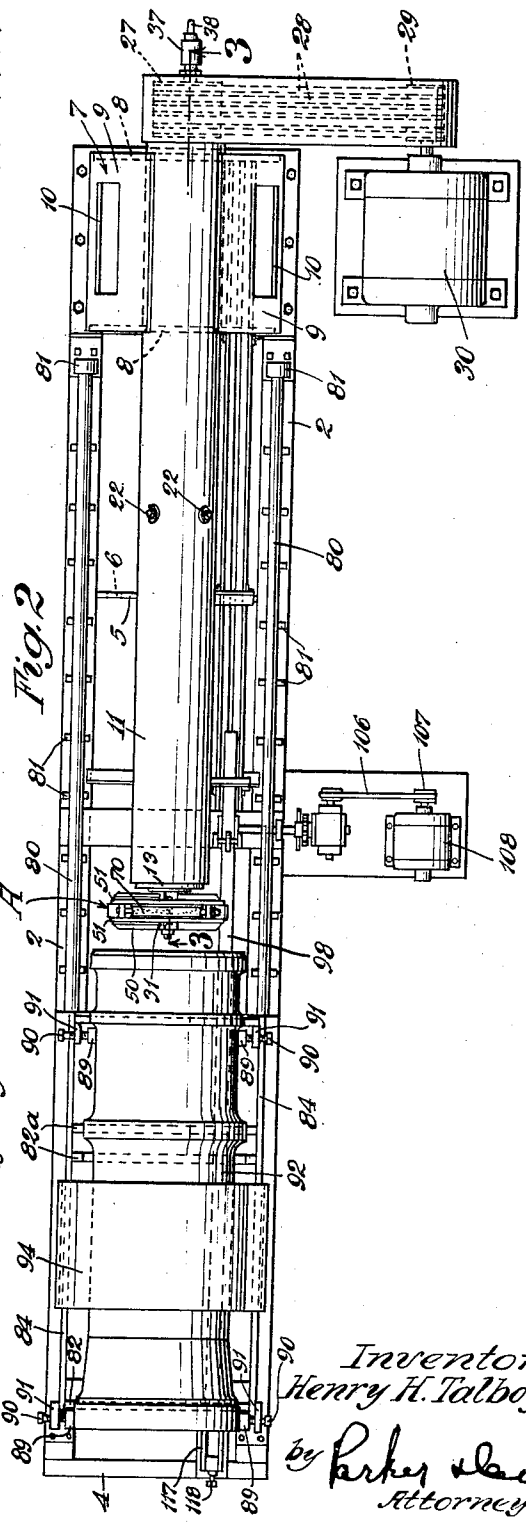


Fig. 2

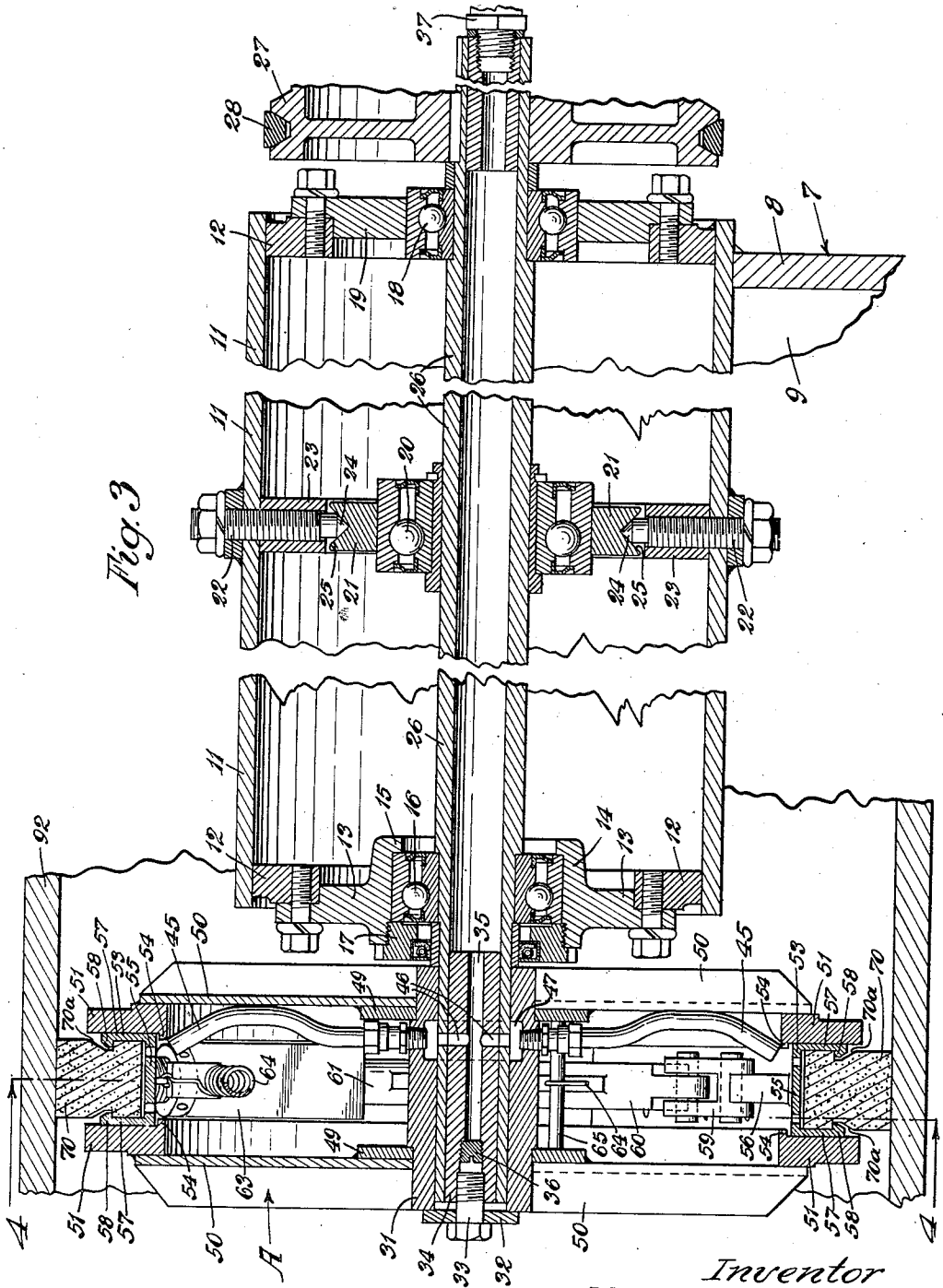
Inventor
Henry H. Talboys
by Parker & Carter
Attorneys.

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Fig. 3



Inventor
Henry H. Talboys
by Parker & Carter
Attorneys.

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Fig. 4

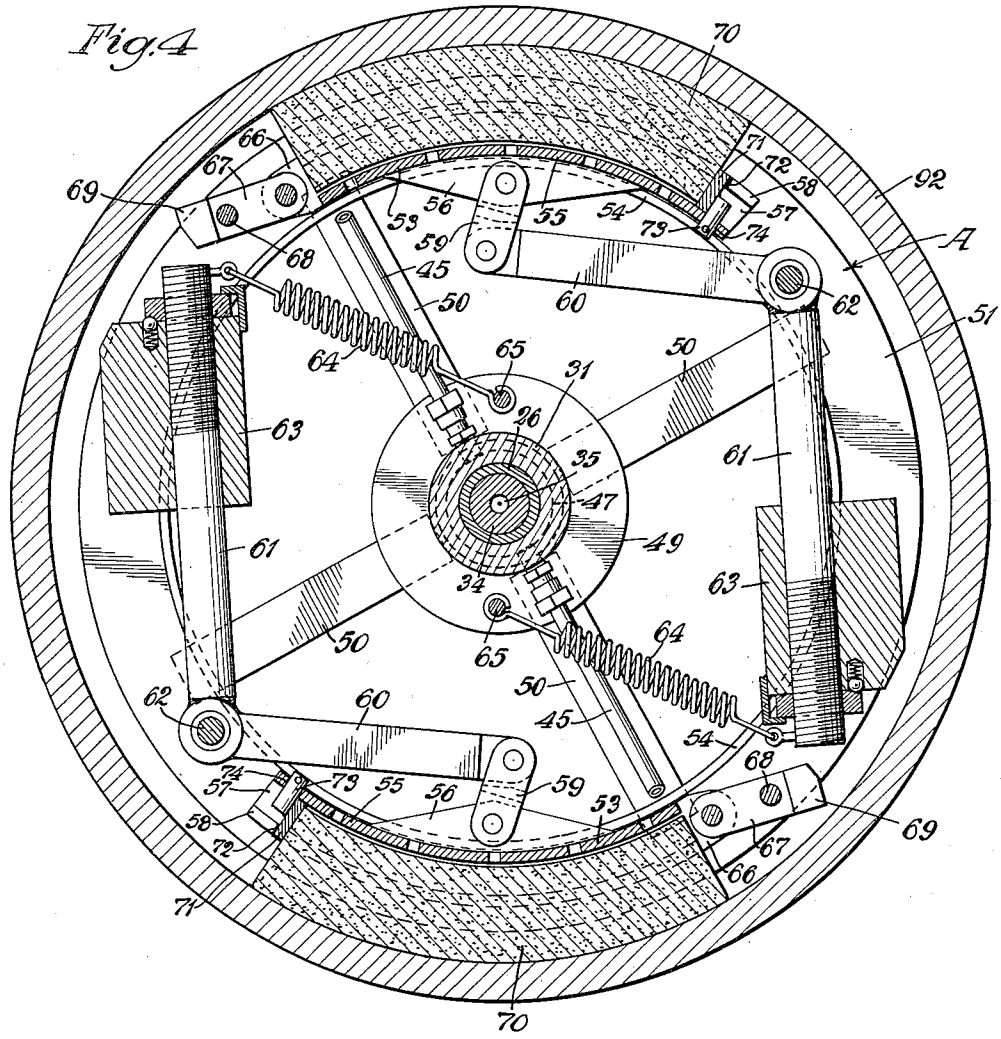
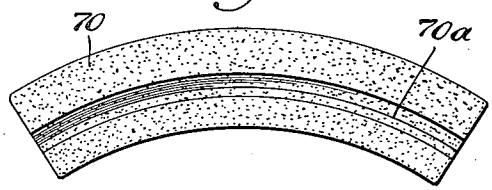


Fig. 5



Inventor
Henry H. Talboys
by Parker & Carter
Attorneys

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Fig. 6

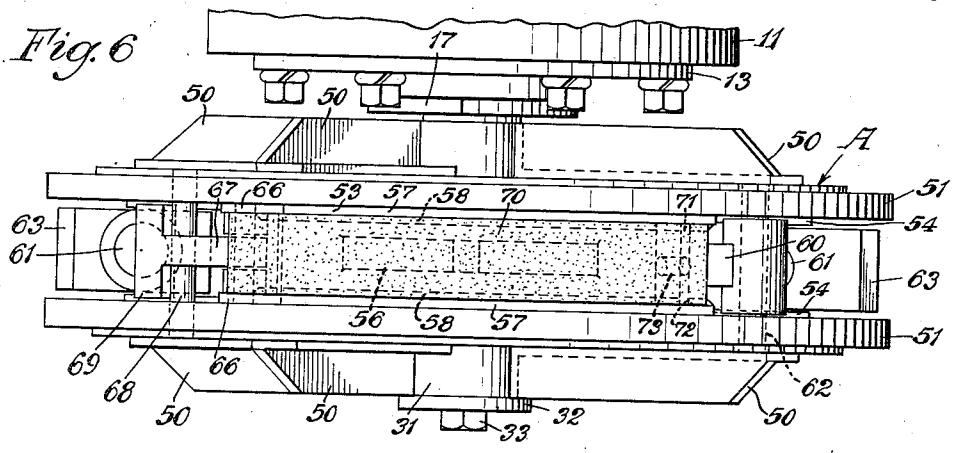


Fig. 7

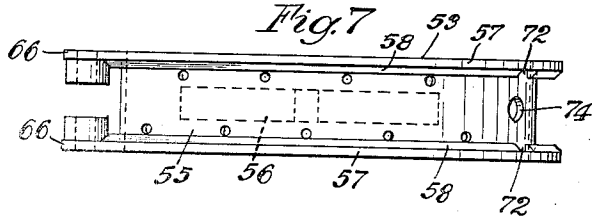
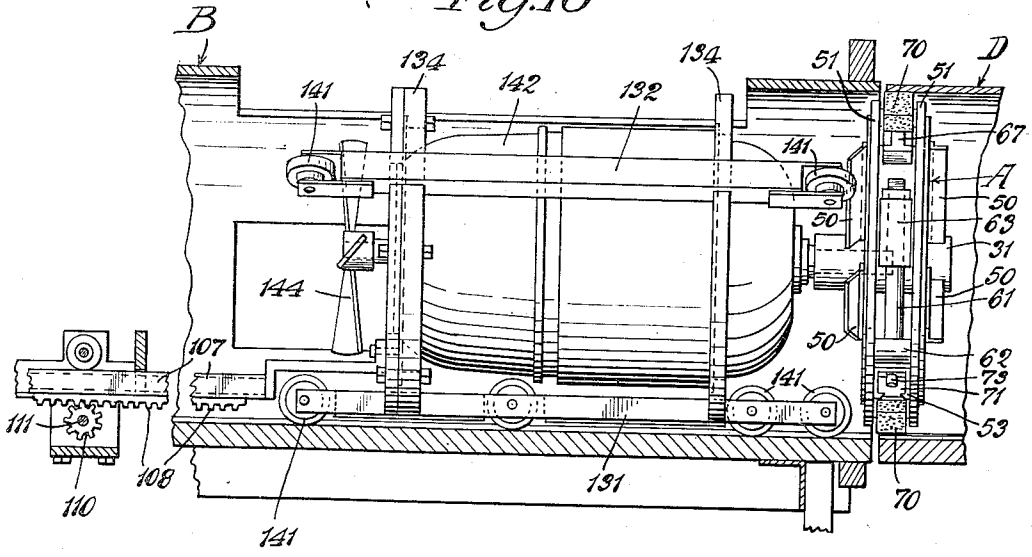


Fig. 10



Inventor
Henry H. Talboys
by Parker & Carter
Attorneys.

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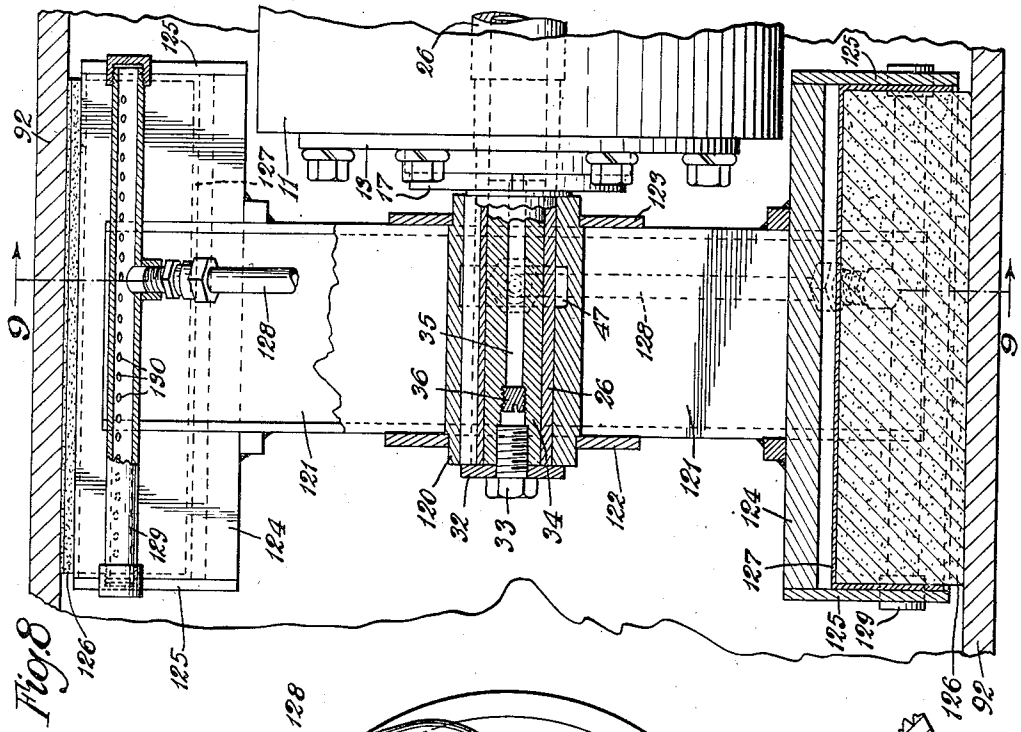


Fig. 8

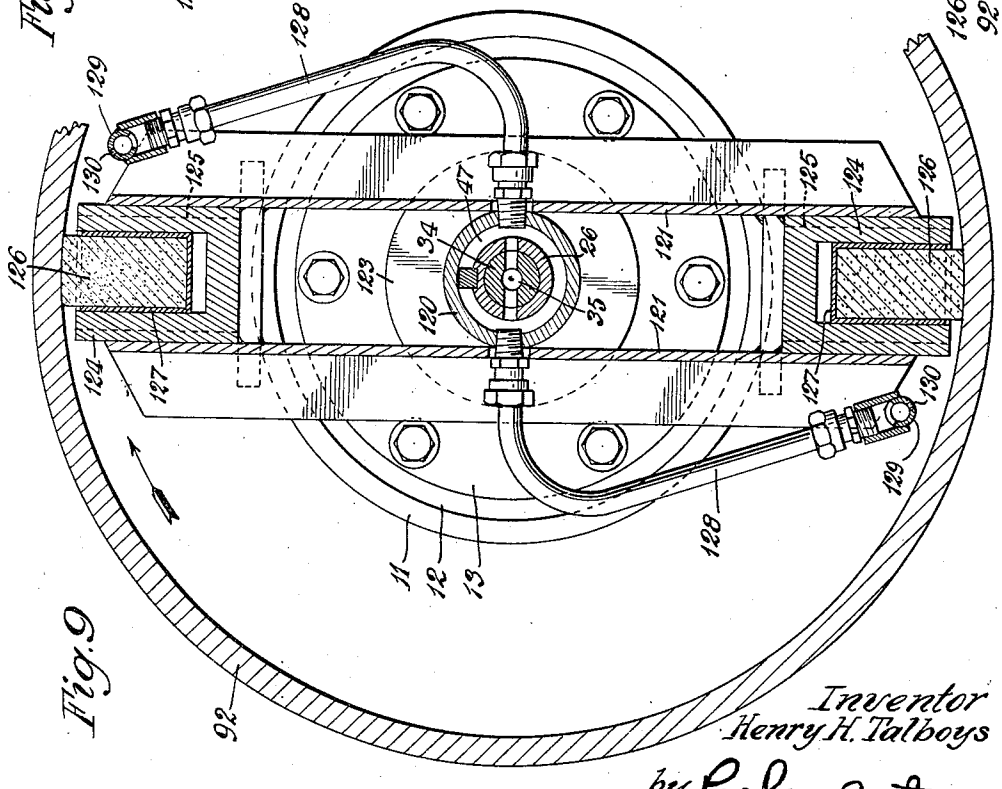


Fig. 9

Inventor
Henry H. Talboys
by Parker & Carter
Attorneys

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UNITED STATES PATENT OFFICE

2,442,624

INTERNAL GRINDER AND POLISHER

Henry H. Talboys, Milwaukee, Wis., assignor to Nordberg Manufacturing Company, Milwaukee, Wis., a corporation of Wisconsin

Substituted for application Serial No. 497,585, August 6, 1943. This application July 20, 1944, Serial No. 545,786

17 Claims. (Cl. 51—184.1)

1

This invention relates to an improvement in means for finishing the interior of cylindrical members. One purpose of the invention is the provision of an interior finisher which is effected to smooth an inner cylindrical surface.

Another purpose of the invention is the provision of means for truing such surface and rendering it of uniform diameter.

Another purpose is the provision of an improved means for delivering cooling liquid to such a finisher;

Another purpose is the provision of an improved rotary working tool or head for smoothing an inner cylindrical surface in which the individual working member or members of such head are centrifugally urged against the work in response to the rotation of the head.

Another purpose is to provide an improved working or grinding element for such a head.

Another purpose is to provide means for varying or controlling and adjusting the centrifugal thrust.

Other objects will appear from time to time throughout the specification and claims.

The present application is a substitute for abandoned application Serial No. 497,585. The present application is also a continuation-in-part of copending applications Serial No. 473,464, filed January 25, 1943, now Patent No. 2,419,665, dated April 23, 1947, and Serial No. 473,811, filed January 28, 1943, now Patent No. 2,405,467, dated August 6, 1946.

My invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a side elevation with parts in section;

Figure 2 is a plan view;

Figure 3 is a section on an enlarged scale along the line 3—3 of Figure 2;

Figure 4 is a section along the line 4—4 of Figure 3;

Figure 5 is a side elevation of an abrasive segment;

Figure 6 is a plan view of the structure shown in Figure 4;

Figure 7 is a plan view of the shoe employed in Figure 4;

Figure 8 is an axial section through a variant form of head;

Figure 9 is a section along the line 9—9 of Figure 8;

Figure 10 is a side elevation illustrating a variant type of support for the tool,

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Like parts are indicated by like characters throughout the specification and drawings.

It will be understood that the rotary tool herein described and claimed may be employed in connection with a variety of different structures. It may be mounted for bodily movement along the interior of a tube with a power plant moving with the tool. Such a structure is shown in Figure 10. In the form of Figures 1 to 9, I illustrate the head as applied to a fixed supporting structure, the head being rotated in relation to work which is moved axially in relation to the head.

Referring to Figures 1 and following, 1 indicates any suitable supporting structure upon which the device is mounted, here indicated as a floor. On the floor is illustrated any suitable base herein shown as including a pair of longitudinally extending I-beams 2, connected by a bottom plate 3, and end portions 4, whereby an open topped tank is provided. If necessary, any suitable transverse connectors 5, may be employed. The intermediate members may be provided with openings 6 for permitting liquid to flow therethrough. 7 generally indicates a support upstanding from the base members 2. It may include end supports 8, and side plates 9, the side plates being broken away as at 10. Mounted in any suitable manner on this upstanding support 7, for example welded thereto, is a tubular member 11. It will be understood that the longitudinal extension of the member 7 is sufficient so that the tube 11, although as shown in Figure 1 extends laterally a substantial distance from the support 7, is held with substantial rigidity.

Referring for example to Figure 3, the tube 11 is provided at each end with head rings 12. Mounted in the left hand head ring, referring to the parts as shown in the position shown in Figure 3, is a bearing assembly including a ring 13, a sleeve 14 shown as integral therewith and having a circumferential inwardly extending flange 15. A ball bearing assembly is generally indicated at 16, it being held in position, for example by the threaded plate or retainer 17. A suitable ball bearing assembly 18 is mounted within the right hand head ring 12, for example by means of a plate 19. An intermediate ball bearing assembly 20 within a ring 21 may be adjusted for example by adjusting screws 22 passing through a ring 23. The ends of the screws 22 are herein shown as being conic as at 24 and entering the corresponding groove 25 in the exterior of the ring 21. Within the three ball bearing assemblies 16, 18 and 20 rotates the shaft 26 herein shown as hollow. The shaft may be driven by any suitable pulley

27 about which pass one or more belts 28, which in turn extend about the drive pulley 29 in any suitable motor 30 mounted at any suitable location in relation to the base members 2. Any suitable switch not here shown may be employed for controlling the motor circuit. It may be advantageous to have the shaft 26 constantly driven.

Mounted on the opposite end of the shaft from the pulley 27 is a grinder or finishing assembly generally indicated as A. It includes a hub 31 keyed on the shaft 26 and held by the retaining washer 32 and the screw 33. The screw 33 penetrates a filler block 34 fixed in relation to the shaft 26 and provided with a longitudinal bore 35 in communication with the hollow interior of the shaft 26 and closed at its outer end by the plug 36. It will be understood that a fluid, for example, a cooling liquid may be admitted to the hollow interior of the shaft 26 through any suitable fitting 37 in communication with any suitable source of the liquid.

I illustrate for example a tube 38 extending to a pump driven for example by a motor 40. The line 41 extends to the above described tank within the base members 2 and it will be understood that the cooling liquid may be recirculated from the tank. Any suitable means may be employed, if desired, for filtering the liquid but it will be understood that the tank serves as a settling chamber.

In order to deliver the cooling liquid to the work adjacent the operating point, there is illustrated a pair of generally radially extending delivery ducts 45 in communication with the bore 35, for example by passages 46, communicating with a cored or bored out aperture 47 in the hub 31. The delivery ends of the passages 45 may be inclined as shown in Figure 3 and are positioned in proper relation to the grinding segments below described.

49, 49 indicate a pair of hub disks pressed on or otherwise secured to the sleeve or hub 31. Referring for example to Figures 3 and 4, there are illustrated a plurality of radial arms 50, four extending from each of the hub plates 49, each supporting a ring 51. The rings 51 define between them a space for two or more shoes or segment holders generally indicated at 53. The inward movement of these segment holders toward the axis of the head is limited by inwardly extending flanges 54 on the opposite rings 51. Each segment holder includes an arcuate bottom plate 55 with a radially inwardly extending flange 56 and side plates 57 terminating in inwardly extending flanges 58. The flange 56 has pivoted thereto a link 59, the opposite end of which is pivoted to a lever 60 which with its associated lever 61 forms a bell crank lever structure pivoted at 62 to the rings 51. Adjustable on the lever 61 is a counterweight 63. 64 is a spring extending from the outer end of the lever 61 to the hub plates 49, where if desired, it may be secured to a pin 65 extending between the hub plates. At the forward end of the shoe are lugs 66 to which are pivoted a link 67 pivoted in turn as at 68 to the rings 51. It may be advantageous to provide a counterweight 69 at the forward end of the link 67. 70 indicate removable abrasive or polishing segments which are provided with channels 70a to receive flanges 58, of the shoe sides 57. The rear end of the shoe is open to permit the insertion of the segments 70 and any suitable retaining plate 71 could be employed. It may, for example, be slipped into slots 72 in the flanges 58. The plate 71 may be locked in its inward position for example by the pin 73 which passes through an aperture 74 in the shoe bottom plate 55.

It will be understood that what has been described is a rotary structure or head which rotates about a fixed axis and which is mounted at the end of the tube 11, the tube 11 being of sufficient length so that the work can be moved along and about the tube 11 with its inner surface in engagement with the finishing head. In the main, the length of the work is preferably less than the length of the member 11 so that the work may be operated upon from end to end by merely moving the work in relation to the rotary head A.

In order to move, guide and support the work, there are employed a pair of tracks 80. They are shown, for example in Figure 1 as circular bars mounted on supports 81 upwardly extending from the side frame members 2. Mounted to ride on the rails 80 is a carriage including end plates 82, bottom members 83 and side plates 84. Downwardly extending from the bottom members 83 are forks 85 in which are rotatably mounted rail engaging wheels 86 which may be provided with ball bearings. Intermediate supporting plates 82a may also be provided for taking work of various size. As a matter of convenience, the plates 82 and 82a are shown as having semi-circular top edges 88. This may be a convenience where the work has a generally cylindrical exterior but in order to provide an accurate adjustment of the work in relation to the axis of the head A, there are provided adjusting blocks 89 herein shown as arranged in groups of three, on each of the end plates 82. These blocks may be adjusted radially by adjusting screws 90 passing through any suitable screw threaded abutments 91. It is thus possible to center the work accurately so that the axis of the inner aperture of the work is accurately aligned with the axis of rotation of the head A. In the event that the work has apertures in it as are shown for example at 93, in the work generally indicated as 92 in Figure 1, it may be advantageous to surrounding the apertured portion of the work with any suitable guard or shield 94 whereby the escape of the cooling liquid is prevented, the liquid being caught by the shield. Similarly a lower shield 95 may be employed with a bottom drainage opening 96.

Any suitable means may be employed to actuate the work and the supporting carriage therefor, which do not of themselves form part of the present invention. I may, for example use a rack bar 98. Driving means for the rack bar 98 may include, for example, any suitable reversing motor 108 and drive pulley 107, which by means of a belt drives any suitable driving mechanism for actuating the rack bar 98. 115 is any suitable terminal stop which may have an adjustable member 116 engaging the end of the rack bar 98. 117 is any suitable stop member with an adjustable member 118 for the opposite end of the carriage excursion.

Referring to the form of Figures 8 and 9, there is illustrated a variant form of head in which cutting or grinding elements are mounted for centrifugal generally axial sliding movement. There is illustrated for example, a hollow hub 120 which is substantially the same as the hub shown in Figure 3. The details therefore will not be redescribed. Extending radially therefrom are channels 121 which may be held on the hub for example by pressed rings 112, 123. The structure as a whole is preferably welded together.

Supported at the outer ends of the channels, one at each side of the head are end cages formed of U-shaped members 124 with end plates 125; slidable within the channel formed by the U-shaped members 124, are abrasive or polishing elements 126 which may, if desired, be mounted in metal shells 127. In response to rotation of the head, the grinding members 126 move centrifugally outwardly against the work 92 as shown for example in Figure 9. The cooling liquid may be delivered from the interior of the hollow hub 120 by any suitable passages 128 which communicate with distribution pipes 129 which may be provided with slots or a plurality of apertures 130 which spray the liquid in front of the zone of engagement of the members 126 with the work.

Referring to Figure 10, I illustrate more or less schematically, a rotary head which may be identical with that shown in Figures 1 and following and particularly in Figures 3 to 7 inclusive. I mount it, however, on a moving motor unit which includes a supporting structure having endwise extending members 131, 132, which carry wheels or rollers 141 to engage the interior of the work. Centering members 134 support a motor 142. This entire motor structure may be propelled endwise by any suitable means, along the tubular work indicated at D. The working head is the same or substantially the same as shown in Figures 3 and 4 except for the omission of the structure for supplying a cooling fluid to the work. Cooling air may be circulated in any suitable manner through the work D. Note that the motor may also be employed to drive a fan 144 which may assist in maintaining a circulation of cooling air and which also provides a blast for blowing ground material out of the tube. It will be understood that any suitable means may be employed for propelling the above described self-contained motor unit. I illustrate a propeller shaft 107 with a rack 103 which may mesh with a driving pinion 110 on any suitable shaft 111 which may be rotated by any suitable application of power not herein shown. The member B indicates an aligning and supporting housing aligned with the work D, and into which the unit may be withdrawn from the work.

It will be realized that whereas I have shown and described an operating device, still many changes might be made in the size, shape, arrangement, number and disposition of parts without departing materially from the spirit of my invention. I wish, therefore, that my showing be taken as in a large sense as diagrammatic, rather than limiting me to the precise details herein shown.

The use and operation of this invention are as follows:

I provide in the present invention an improved working head or tool for centrifugally grinding or finishing the interior of a tubular member. This head is particularly useful in the finishing of elongated cylindrical apertures. In the form of Figures 1 and following, I illustrate the head as employed with a structure which is moved in relation to the head. In the form of Figure 10, the head is moved in relation to the work. The head is applicable, for example, to finishing interiors of cylinders, preferably of large size or to large valve blocks or to tubular members and housing where a smooth inner surface is desired. When the work is moved in relation to the head or the head in relation to the work, the head is rotated at relatively high speed. This results in an outward centrifugal thrust of the segments 70 and

of the shoes in which they are mounted. They are, however, permitted to adjust their position in relation to the inner face of the work. The thrust is sufficient to smooth the surface of the work and, during relative movement of the work and the rotating head, the cylindrical surface of the work may be smoothed and to a substantial degree trued from end to end.

Note that the segments 70 and their supporting shoes are connected by intermediate links 67 to the rings 51, and the links 59 provide loose connections with the centers 62. Thus the subjection of the shoes and segments to centrifugal force, as a result of the rotation of the head A causes a generally uniform thrust of all parts of the outer surface of the segments against the inner surface of the work.

It will be understood, of course, that the counterweights 63 are so manipulated that the centrifugal thrust of the segments 70 will always necessitate the centrifugal outward thrust of the counterweights. In the use of the device, it may operate, if desired, not merely as a polishing or finishing device but as a truing device. For example, if there are projections or unevennesses on the inner wall of the work, these unevennesses tend to be planed or ground down with considerable rapidity. Inertia prevents a sudden adaptation of the shoe 70, to local reductions in radius and thus inward projections or unevennesses tend to be planed or ground off. Experience indicates also that the interior of the work is ground down to a close approximation to a truly uniform diameter.

It will be understood that the counterweighting of the shoe 63 provides an automatic adjustment, since as the grinding material wears away, the heavy metal shoe advances further from the center of rotation and thereby increases its centrifugal weight. Also the counterweight retracts toward the center of rotation and thereby loses some of the centrifugal weight, thus compensating for loss of actual weight of grinding material.

It will be understood that I may employ the duct system herein shown including the ducts 45 to supply any suitable cooling fluid preferably, but not necessarily, in liquid form.

In the form of Figure 10, no employment of a cooling liquid is provided. The head, however, so far as its centrifugal grinding, finishing or smoothing operation is concerned, operates just like the head as shown in Figures 3 and 4.

I claim:

1. In a finishing device for finishing the interior surface of a hollow generally cylindrical element, motor means, a rotor adapted to be positioned within said hollow element, a driving connection between said rotor and the motor means, a surfacing element movably mounted on said rotor for centrifugal movement toward the interior surface in response to rotation of the rotor, and means for varying the centrifugal thrust of said surfacing element, including a counterweight responding to the rotation of the rotor, an actuating connection between the counterweight and the surfacing element, and means for varying the position of the counterweight.

2. In a finishing device for finishing the interior surface of a hollow generally cylindrical element, motor means, a rotor adapted to be positioned within said hollow element, a driving connection between said rotor and the motor means, a surfacing element movably mounted on said rotor for centrifugal movement toward

the interior surface in response to rotation of the rotor, and means for varying the centrifugal thrust of said surfacing element, including a bell crank lever pivoted on the rotor, a counterweight adjustably mounted on one arm of the lever and an actuating connection between the other arm of the lever and the surfacing element.

3. In a rotary finishing head for grinding generally cylindrical interior surfaces, a hub, a pair of axially spaced rings mounted on said hub, one or more shoes mounted between said rings for centrifugal movement toward the surface to be finished, a counterweight for each such shoe, movably mounted on the head, and an actuating connection between said counterweight and its associated shoe, and yielding means tending normally to urge said counterweight inwardly toward the axis of the head.

4. In a rotary finishing head for grinding generally cylindrical interior surfaces, a hub, a rotor structure extending outwardly from said hub, a shoe mounted on said rotor, a link pivoted to said rotor and said shoe, said link being located at the forward end of the shoe in relation to the direction of rotation of the rotor, a bell crank lever mounted on the rotor, a counterweight mounted on one arm of the bell crank lever and a pivotal actuating connection between one arm of the lever and the shoe.

5. In a grinding element for rotary finishing heads for grinding generally cylindrical interior surfaces, a shoe having a bottom wall and a pair of generally parallel side walls projecting upwardly along opposite edges of the bottom wall, inward projections adjacent the upper edges of said side walls, a grinding segment conforming generally to the space bounded by said walls and having parallel channels in the opposite walls thereof adapted to interlock with the inward projections at the tops of said side walls of the shoe and means for removably locking said segment in position in the shoe, the upper or grinding surface of said segment conforming generally to the cylindrical interior surface to be ground.

6. In a finishing device for finishing interior surfaces, a rotary head and means for rotating it, a surface grinding element movably mounted on said head for centrifugal outward movement toward the work in response to rotation of the head, and a simple link connection between one point on said element and the head and a compound link connection between another portion of said element and the head and a counterweight associated with said compound connection.

7. In a finishing device for finishing interior surfaces, a rotary head and means for rotating it, a surfacing element movably mounted on said head for centrifugal outward movement toward the work in response to rotation of the head, and a simple link connection between one point on said element and the head and a compound link connection between another portion of said element and the head and a counterweight associated with said compound connection, said compound connection including a bell crank lever pivoted to the head with two arms of the bell crank lever extending from said pivot, said counterweight being mounted upon one said arm, the other said arm being connected to said surfacing element, said counterweight, when the head is rotated, being adapted to resist centrifugally the centrifugal movement of the surfacing element toward the work.

8. In a finishing device for finishing interior surfaces, a rotary head and means for rotating it, a surfacing element movably mounted on said head for centrifugal outward movement toward the work in response to rotation of the head, and a simple link connection between one point on said element and the head and a compound link connection between another portion of said element and the head and a counterweight associated with said compound connection, said counterweight, when the head is rotated, being adapted to resist centrifugally the centrifugal movement of the surfacing element toward the work, and means for varying the effective outward centrifugal thrust of said counterweight.

9. In a finishing device for finishing interior surfaces, a rotary head and means for rotating it, a surfacing element movably mounted on said head for centrifugal outward movement toward the work in response to rotation of the head, centrifugal counterweight means adapted to reduce the effective centrifugal thrust of the surfacing element, including a counterweight mounted upon the head and a connection between the counterweight and the surfacing element, and an additional connection between the surfacing element and the rotary head.

10. In a rotary finishing head for grinding generally cylindrical interior surfaces, a shaft and means for rotating it, a head structure extending outwardly from and rotatable with said shaft, an abrasive member mounted on said head structure for inward and outward movement thereon, and supporting and positioning means for said member including a bell crank lever pivoted to the head structure, a weight mounted on one arm of said bell crank lever and a connection between the other arm of said bell crank lever and the abrasive member.

11. In a rotary finishing head for grinding generally cylindrical interior surfaces, a shaft and means for rotating it, a head structure extending outwardly from and rotatable with said shaft, an abrasive member mounted on said head structure for inward and outward movement thereon, and supporting and positioning means for said member including a bell crank lever pivoted to the head structure, a weight mounted on one arm of said bell crank lever and a connection between the other arm of said bell crank lever and the abrasive member, said weight being adjustable toward and away from the center of rotation of said bell crank lever.

12. In a rotary finishing head for finishing generally cylindrical interior surfaces, a shaft and means for rotating it, a head structure extending outwardly from and rotatable with said shaft, a finishing member mounted on said head structure for inward and outward movement thereon, and supporting and positioning means for said finishing member including a bell crank lever pivoted to the head structure for rotation about an axis parallel with the axis of the head structure, a weight mounted on one arm of the bell crank lever, a link connecting the other arm of the bell crank lever and the finishing member, and an additional link pivoted to another part of said finishing member and to the head structure.

13. In a rotary finishing head for finishing generally cylindrical interior surfaces, a shaft and means for rotating it, a head structure extending outwardly from and rotatable with said shaft, a finishing member mounted on said head structure for inward and outward movement thereon, and supporting and positioning means for said finishing member including a bell crank lever

pivoted to the head structure for rotation about an axis parallel with the axis of the head structure, a weight mounted on one arm of the bell crank lever, a link connecting the other arm of the bell crank lever and the finishing member, and an additional link pivoted to another part of said finishing member and to the head structure, and yielding means tending normally to urge said weight toward the axis of the rotor.

14. In a rotary finishing head for finishing generally cylindrical interior surfaces, a shaft and means for rotating it, a head structure extending outwardly from and rotatable with said shaft, a finishing member mounted on said head structure for inward and outward movement thereon, and supporting and positioning means for said finishing member including a bell crank lever pivoted to the head structure for rotation about an axis parallel with the axis of the head structure, a weight mounted on one arm of the bell crank lever, a link connecting the other arm of the bell crank lever and the finishing member, and an additional link pivoted to another part of said finishing member and to the head structure, said weight being adjustable along said arm to the bell crank lever toward and away from the pivot of said lever.

15. In a rotary finishing head for finshing generally cylindrical interior surfaces, a shaft and means for rotating it, a head structure extending outwardly from and rotatable with said shaft, a finishing member mounted on said head structure for inward and outward movement thereon, and supporting and positioning means for said finishing member including a bell crank lever pivoted to the head structure for rotation about an axis parallel with the axis of the head structure, a weight mounted on one arm of the bell crank lever, a link connecting the other arm of the bell crank lever and the finishing member, and an additional link pivoted to another part of said finishing member and to the head structure, said finishing member including a generally segmental channel having undercut side portions and a generally segmental abrasive body located in said channel and having side portions interpenetrating with said undercut side portions, said channel having a closed end and an open end through which said abrasive body is insertable, and means for retaining said abrasive body in said channel.

16. In a rotary finishing head for grinding generally cylindrical interior surfaces, a hollow shaft and means for rotating it, a rotor structure extending outwardly from such shaft, a working shoe movably mounted on said rotor structure, means for guiding said shoe for centrifugal movement toward the work, a work engaging element removably mounted on said shoe and means for delivering a cooling fluid toward the work, adjacent the area of contact between the work and the shoe including a delivery duct, rotating with said rotor and in communication with the interior of the hollow shaft and extending outwardly therefrom, said duct having a discharge outlet located adjacent said shoe.

17. In a rotary finishing head for grinding generally cylindrical interior surfaces, a hollow shaft and means for rotating it, a rotor structure extending outwardly from such shaft, a working shoe movably mounted on said rotor structure, means for guiding said shoe for centrifugal movement toward the work, a work engaging element removably mounted on said shoe and means for delivering a cooling fluid toward the work, adjacent the area of contact between the work and the shoe including a delivery duct, rotating with said rotor and in communication with the interior of the hollow shaft and extending outwardly therefrom, said duct having a discharge outlet located adjacent said shoe, the guiding means for said shoe being adapted to guide it generally radially outwardly toward the work.

HENRY H. TALBOYS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,181,114	Crandall	May 2, 1916
1,396,123	Joseph	Nov. 8, 1921
1,550,807	Heon	Aug. 25, 1925
1,698,590	Harter	Jan. 8, 1929
1,739,956	Emerson	Dec. 17, 1929
1,957,485	Zimmerman	May 8, 1934
2,065,221	Hellyar	Dec. 22, 1936
2,229,314	Solbrig	Jan. 21, 1941
2,256,495	Rioux	Sept. 23, 1941
2,280,769	Page	Apr. 21, 1942