

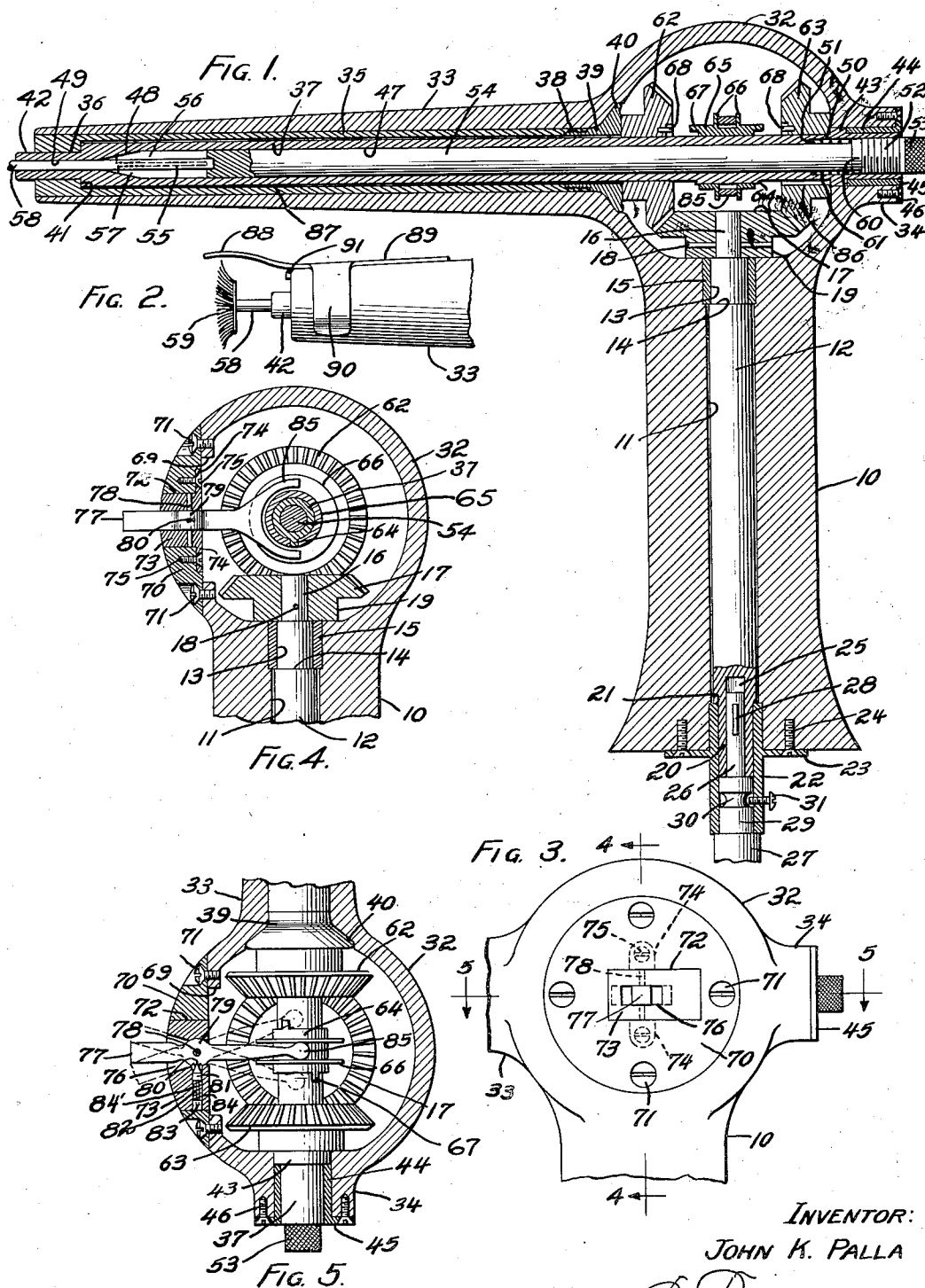
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ROTARY TOOL

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ROTARY TOOL

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2 Claims. (Cl. 15—28)

The present invention relates to rotary tools, and more specifically to the handle therefor, and has for its object the provision of a handpiece wherein suitable mechanism for rotating a tool is positioned.

A further object of the present invention is a provision of a rotary tooth brush operable by a suitable mechanism.

A further object of the present invention is the provision of a rotary tooth brush, including a rotary shaft which may be rotated into one or the other direction by means of gear connection, and wherein the direction of rotation of the rotatable shaft is accomplished through the medium of a clutch.

A further object of the present invention is the provision of a device of the character indicated which may be operated by means of a flexible shaft, intermediately connected to a bevel gear.

A still further object of the present invention is the provision of a device of the character indicated which may consist of comparatively few parts which may be easily manufactured and assembled.

With the above general objects in view and others that will appear as the nature of the invention is better understood, the same consists in the novel constructions, combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawing and pointed out in the appended claims.

In the drawing forming a part of this application, and in which like designating characters refer to corresponding parts throughout the several views,

Fig. 1 is an elevational cross-sectional view of the device;

Fig. 2 is an elevational fragmentary view of the end of the cylindrical casing, with a tooth brush in position, and a guard therefor;

Fig. 3 is a fragmentary elevational view of one side of the device;

Fig. 4 is a cross-sectional view on line 4—4 of Fig. 3; and

Fig. 5 is a cross-sectional view on line 5—5 of Fig. 3.

Referring to the present drawing in detail there is shown therein an elongated cylindrical handle 10 which is provided with a longitudinal central bore 11. Journaled within said bore 11 is a shaft 12, the upper end of which is reduced as at 13 to affect a shoulder 14 to bear against collar 15 fitted in the enlarged upper end of said bore 11, for preventing the upward shifting movement of said shaft 12. The upper end of said shaft 12 is

further reduced as at 16 and upon this reduced end a bevel gear 17 is rigidly affixed through the medium of pin 18 passing through the hub 19 of said gear 17 and through the said end 16.

The lower end of shaft 12 is likewise reduced as at 20 to provide a shoulder 21 to bear against bushing 22 fitted in the enlarged lower end of bore 11 and having a horizontal flange 23 extending from substantially the central portion thereof, said bushing 22 being rigidly affixed through the medium of screws 24 to the lower end of said handle 10. The lower end of said shaft 12 is provided with a central bore 25 to receive therewithin a rigid, reduced end 26 of the flexible shaft 27. Said end 26 is provided with a laterally extending key 28 which is received within a suitable longitudinal slot, not shown, made in the lower reduced end of said shaft 12, by virtue of which arrangement the rotation of the flexible shaft 27 is transmitted to shaft 12. Said flexible shaft 27 is further provided, in its continuation, with a cylindrical reduced portion 29 which is provided at one point of its periphery with an annular groove 30 within which the end of screw 31, passing through the outwardly projecting portion of bushing 22, is received. Thus, it will be seen, screw 31 prevents the disengagement of flexible shaft 27 from within bushing 22 and from the lower end of shaft 12, but does not interfere with the rotation of flexible shaft 27 and with the transmission of the rotation thereof to shaft 12 through the medium of key 28. The opposite end of flexible shaft 27 may be connected to an electric motor whereby said flexible shaft 27 is rotated.

Extending from the upper end of said handle 10, and integrally formed therewith, is a spherical housing 32, from one point whereof extends a cylindrical casing 33, which projects at a right angle with respect to handle 10 as clearly seen on Fig. 1. Also extending from said spherical housing 32, at a point opposite from said cylindrical casing 33, is a hollow stub 34, for the purpose hereinafter described.

Since it is contemplated that handle 10, spherical housing 32, cylindrical casing 33 and stub 34 are to be made of hard rubber, "bakelite" or other similar light and brittle material, for the purpose of strengthening the structure of said cylindrical casing 33 a tube 35 is inserted within said cylindrical casing 33. Said tube 35 may be made of steel or other hard material, which constitutes a lining for the inner periphery of said cylindrical casing 33 and strengthens the structure thereof. The outer end of said tube 35 has an inwardly

projecting flange 36 which acts as a collar or bushing for rotatable cylindrical shaft 37 hereinafter described. Engaging the inner end of said tube 35 by means of screw threads 38 is a cylindrical collar 39 which is provided with a tapered and outwardly flaring flange 40 which bears against the adjacent body portion of said spherical housing 32, at a point from which said cylindrical casing 33 immediately projects. By virtue of this construction tube 35 will be prevented from longitudinal shifting within said cylindrical casing 33 and in the direction of its outer end.

Said rotatable cylindrical shaft 37, received within said tube 35 and cylindrical collar 39 is reduced at its outer end to provide shoulder 41 which bears against flange 36, by virtue whereof said rotatable cylindrical shaft 37 is prevented from shifting in the direction of said flange 36. Said reduced end of said rotatable cylindrical shaft 37 forms a stub 42 which extends past said flange 36 and passes outwardly of the cylindrical casing 33, as clearly seen on Figs. 1 and 2.

Adjacent the other end, said rotatable cylindrical shaft 37 is provided with an integrally formed collar 43, the diameter of which substantially corresponds to the diameter of and is fitted in the bore of stub 34. One edge of said collar 43 remains flush with the inner wall of spherical housing 32, and the opposite outer edge thereof provides a shoulder for bushing 44, which is inserted within the bore of stub 34. The outer end of said bushing 44 is provided with flange 45 by means of which said bushing is affixed to the end of stub 34 through the medium of screws 46. It will therefore be seen that said bushing 44 provides another stop for the rotatable cylindrical shaft 37 for preventing its inward longitudinal movement.

Throughout its major portion said rotatable cylindrical shaft 37 is provided with a uniform central longitudinal bore 47, which, at one of its ends is constricted defining a conical taper 48 which merges concentrically with the outer bore 49 of a reduced diameter, said latter bore portion passing through said stub 42 throughout its length, for the purpose hereinafter stated.

Said bore 47, at the opposite end of said rotatable cylindrical shaft 37 has an enlarged portion 50 providing an inward shoulder 51 for the purpose hereinafter stated. The outer end of said bore portion 50 is inwardly threaded for the purpose of receiving therewithin in threaded engagement a threaded adjusting screw 52 whose outer end is knurled as at 53 for facilitating its manual operations for the purposes hereinafter described.

Receivable within said cylindrical rotatable shaft 37 and within its bore 47 is rod 54, one end of which is hollowed and longitudinally serrated as at 55 to define two or more clamping jaws 56, of which outer ends are tapered as at 57 to correspond to the taper 48 of the adjacent constricted end of bore 47. Shaft 58 of the tool such as of brush 59 insertable through bore 49 is receivable between said jaws 56.

The opposite end of said rod 54 is provided with an integrally formed enlarged head 60 whose diameter substantially corresponds to the diameter of bore 50 and within which said head 60 is fitted for longitudinal movement. Interposed between shoulder 51 and said head 60 is a coil spring 61, for normally urging rod 54 towards said screw lug 52 for the purpose of retracting the tapered ends 57 of jaws 56 from the taper 48 and thus to

decrease the grip of said jaws upon shaft 58 when it becomes desirable to remove the brush from the device, and upon first releasing the head 60 by retracting the screw 52. In other words taper 48, jaws 56 and the tapered ends 57 of the latter act as a chuck for shaft 58, and shall be in the following description referred to as such.

Loosely positioned upon the cylindrical rotatable shaft 37 are two beveled gears 62 and 63, the first named of said gears abutting the collar 40, and the other abutting collar 43 and the adjacent wall of the spherical housing 32. Both of said gears 62 and 63 mesh with gear 17.

Integrally formed with said rotatable cylindrical shaft 37 is an elongated longitudinal key 64, disposed centrally of the portion of said rotatable cylindrical shaft 37 intermediate the two gears 62 and 63. Positioned upon said rotatable cylindrical shaft 37 between said gears 62 and 63 and upon key 64 is clutch 65 including a pair of parallel and laterally projecting annular flanges 66. It will be seen that said clutch 65 is not permitted to make independent rotary movement around said rotatable cylindrical shaft 37 due to the engagement with key 64, but is permitted to make longitudinal sliding movement upon said shaft 37 and key 64 for effecting the engagement thereof with gear 62 or gear 63 depending upon which direction clutch 65 is shifted.

Said clutch 65 at each end thereof has one or more teeth or prongs 67 to enter into a corresponding recess or notch 68 in each gear 62 and 63, depending towards which gear clutch 65 is shifted. It is further observed that clutch 65 remains at all times in engagement with key 64 whether the latter engages gear 62 or 63. Thus when gear 17 rotates and clutch 65 is in engagement with gear 62, the latter gear causes the rotation of the rotatable cylindrical shaft 37 in one direction by virtue of the fact that there is a connection between said shaft 37 and gear 62 through the medium of key 64 and clutch 65. When clutch 65 is thrown into engagement with gear 63 the rotation of the rotatable shaft 37 will be in reverse direction from that when clutch 65 engages gear 62. When clutch 65 remains in a central position or intermediate the two gears 62 and 63, or in a neutral position, both gears 62 and 63, although rotating by virtue of their propulsion by gear 17, will not effect the rotation of the rotatable cylindrical shaft 37. One side of the spherical housing 32 has a round opening 69 which provides access within said spherical housing 32. A round cover 70 provides a closure for said opening 69, said cover 70 being attached to said spherical housing 32 by means of a number of screws 71. At its central portion cover 70 is provided with a substantially rectangular opening 72 to receive there-within a correspondingly shaped block 73, which at its inner side is provided with a pair of oppositely disposed flanges 74 which are countersunk in the inner face of cover 70 and affixed thereto by means of screws 75.

Lengthwise, or parallelly with the rotatable cylindrical shaft 37, block 73 is provided with slot 76 through which clutch operating lever 77 extends and is pivoted therein upon pin 78 which runs transversely of slot 76, and block 73 and extends transversely of rotatable cylindrical shaft 37. A portion of said clutch operating lever 77 lies within slot 76 and around pin 78 it has a hub-like bulge 79 for facilitating angular shifting movement of said lever 77. Bulge 79 on one side has three notches 80 within which the outer

end of plunger head 81 is adapted to enter. Said plunger head 81 is rigidly affixed to plunger rod 82 at one of its ends, while the other end of said plunger rod 82 slides within block 83 which is set within bore 84 made in block 73 and adjacent its edge. Coil spring 84' interposed between block 83 and head 81 urges the latter towards bulge 79. Thus, said plunger head 81 is adapted to engage one of said notches 80 at a given time and maintain the clutch operating lever 77 in its adjusted angular position.

The inner end of said clutch operating lever 77 is provided with fork 85 which straddles clutch 65 between flanges 66.

There are three possible positions for clutch 65, namely, one, the engaging position with gear 62, in which case the clutch operating lever 77 will remain angularly disposed with the lower end thereof or fork 85 nearest to gear 62, while the outer end of said clutch operating lever 77 disposed towards screw 52; another position of said clutch 65, when the same is in engagement with gear 63, and in that position clutch operating lever 77 will likewise remain in an angular position with its fork 85 disposed nearest to gear 63 and the outer end of said lever disposed towards the cylindrical casing 33; both of said latter two positions of the clutch operating lever 77 being shown by dotted lines on Fig. 5; and the third position of clutch 65 is a neutral position illustrated on Fig. 1, in which case clutch operating lever 77 will be in a perpendicular relation with rotatable cylindrical shaft 37, shown by full lines on Fig. 5. In the first of the above positions of the clutch, the plunger head 81 will engage the outermost notch 80, in the second position the innermost notch 80, and in the third position the central notch 80.

Referring now to the assembly of the device, assuming that shaft 12 and gear 17 are already in their operative positions illustrated on Fig. 1, and that tube 35 is likewise in its operative position, the rotatable cylindrical shaft 37 is then inserted through the bore and stub 34. While the insertion progresses through the spherical housing 32, first gear 63 is passed over it, said gear 63 being provided with a keyway 86 for permitting passage therethrough of key 64 as said rotatable cylindrical shaft 37 is passed to its operative position. Thereupon clutch 65 is passed over and upon said shaft 37 and upon key 64, and lastly gear 62 is passed upon said shaft 37. When these parts are all upon shaft 37 said shaft is then driven until shoulder 41 contacts with flange 36. Thereupon bushing 44 is passed into the bore and affixed by screws 46.

Thereupon cover 70, including block 73 and clutch operating lever 77, is set upon the spherical housing 32, first taking care that fork 85 enters between flanges 66.

It is further observed that in order to prevent friction the major portion of the rotatable cylindrical shaft 37 is spaced from tube 35 and cylindrical collar 39 as at 87.

In case the tool used in connection with the device is a tooth brush as shown in Fig. 2, it would be desirable that the brush should operate upon the teeth alone without contacting the wall of the mouth. For that purpose guard 88 is provided which includes shank 89 fitting the periphery of cylindrical casing 33, and a pair of clamping arms 90 extend laterally from said shank 89 and engage the periphery of cylindrical casing 33. Lug 91 stamped out of the guard and bent downwardly provides a stop engaging the

outer end of cylindrical casing 33. Thus it will be seen that said guard 88, including all the component parts thereof, is removable at will from cylindrical casing 33.

While there is described herein a preferred embodiment of the present invention, it is to be understood, nevertheless, that minor changes may be made therein without departing from the spirit and scope of the invention as claimed.

What I claim as new is:

1. In a portable handpiece for rotary tools, a hollow gear housing, an elongated tubular casing integral with and extending from one side of said housing, a hollow stud integral with and projecting from the opposite side of said housing, a tubular lining fitted in said tubular casing, said lining having an inwardly projecting flange at its outer end and having an outwardly projecting flange at its inner end bearing against the adjacent portion of the inner surface of the housing, a hollow shaft rotatably fitted in said lining and having a reduced outer end providing an external shoulder engaging the inner surface of said inwardly projecting flange of the lining, the inner end of said hollow shaft being journaled in said hollow stud, an elongated handle integral with and depending from the bottom of said gear housing and having a longitudinal bore, a drive shaft journaled in the bore of said handle, a gearing in said gear housing for transmitting motion from said drive shaft to said hollow shaft, means for securing the shaft of a tool in the outer end of said hollow shaft including a jaw-carrying rod slidably fitted in said hollow shaft, means for longitudinally shifting said rod in opposite directions, and means co-operating between said rod and said hollow shaft for contracting the jaws of said rod when said rod is shifted in the direction of the tool for gripping the shaft of a tool.

2. In a portable handpiece for rotary tools, a hollow gear housing, an elongated tubular casing integral with and extending from one side of said housing, a hollow stud integral with and projecting from the opposite side of said housing, a tubular lining fitted in said tubular casing, said lining having an inwardly projecting flange at its outer end and having an outwardly projecting flange at its inner end bearing against the adjacent portion of the inner surface of the housing, a hollow shaft rotatably fitted in said lining and having a reduced outer end providing an external shoulder engaging the inner surface of said inwardly projecting flange of the lining, the inner end of said hollow shaft being journaled in said hollow stud, an elongated handle integral with and depending from the bottom of said gear housing and having a longitudinal bore, a drive shaft journaled in the bore of said handle, a gearing in said gear housing for transmitting motion from said drive shaft to said hollow shaft, means for securing the shaft of a tool in the outer end of said hollow shaft including a jaw-carrying rod slidably fitted in said hollow shaft, an adjusting screw threaded in said hollow stud and engaging the inner end of said rod for forcing the latter outwardly, the bore of said hollow shaft and the jaws of said rod being cooperatively formed to cause contraction of said jaws to grip the tool shaft when the rod is forced outwardly, and a spring on the inner end of said rod for moving the latter inwardly to release the jaws when the adjusting screw is retracted.