

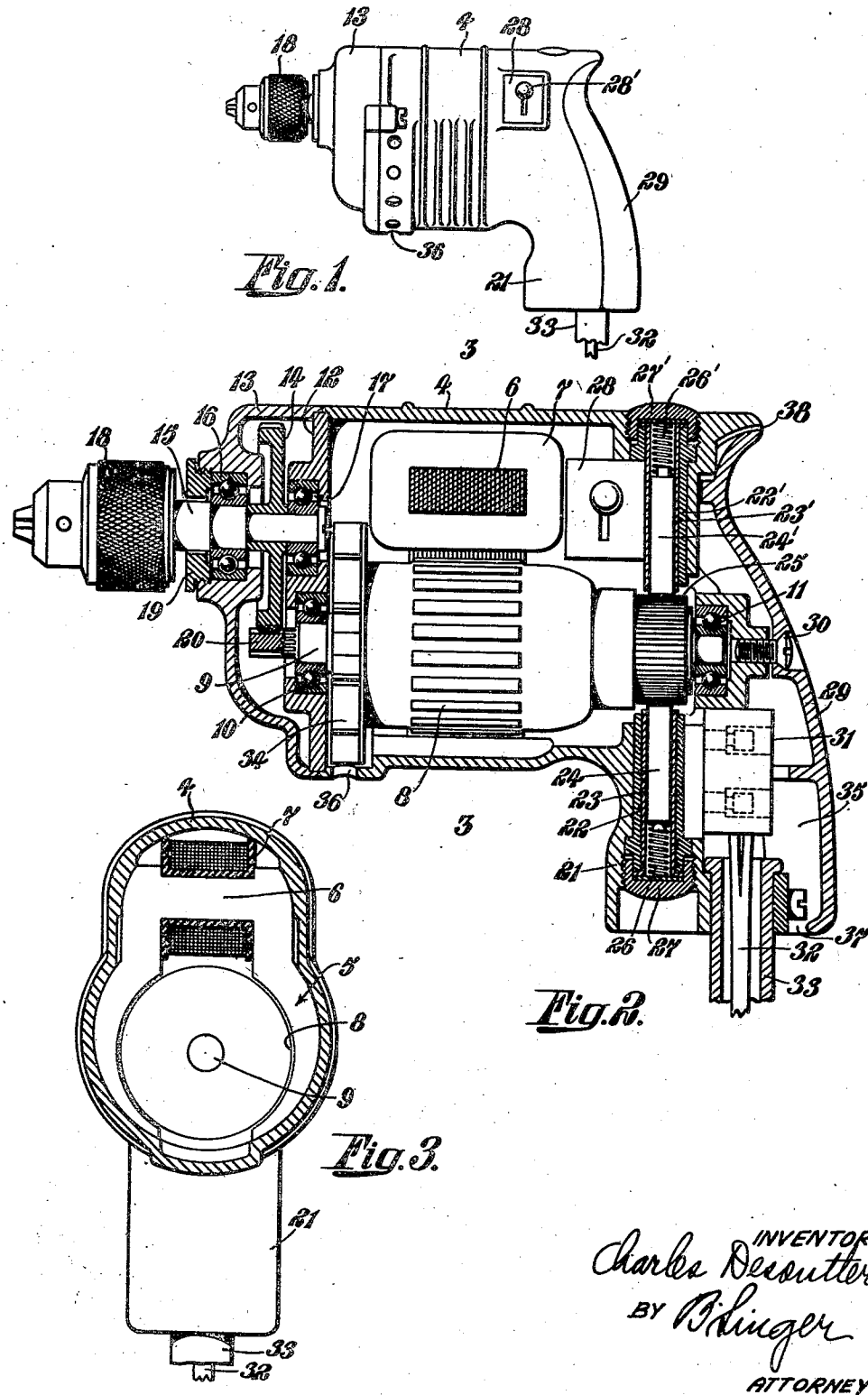
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C. DESOUTTER

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ROTARY TOOL DEVICE

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INVENTOR
Charles Desoutter
BY *Whinger*
ATTORNEY

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ROTARY TOOL DEVICE

Charles Desoutter, London, England

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This invention relates to hand applied rotary tool devices incorporating an electric motor and particularly, although not exclusively, to such devices suitable for rotary drilling purposes.

Such rotary tool devices according to the invention include a single handle (or pistol-grip) projecting at a desired angle transversely to the axis of the motor and are characterized by the fact that a brush of the said motor extends longitudinally within the said transverse handle.

Such an arrangement enables brushes of comparatively great length to be accommodated conveniently whilst maintaining the main casing of the tool device of short length and of small radial dimensions, with the result that the tool is particularly efficient and robust whilst nevertheless being of light weight and consequently can be easily manipulated.

According to a further feature of the invention the electric motor incorporated in the device has a magnetic field element of the so-called "horse-shoe" type, and the arrangement is such that the yoke portion of this field element, which yoke portion may incidentally carry field windings, is disposed at the opposite side of the axis of the motor to that occupied by the transversely extending handle portion or pistol grip, for the purpose of providing sufficient space for the accommodation of a further brush which is oppositely disposed with respect to the brush contained within the said pistol-grip handle portion. This arrangement enables the further brush also to be of comparatively great length without requiring any radial extension of the casing beyond that necessary to conveniently accommodate the magnetic system of the motor. Further the arrangement also provides sufficient space for the accommodation of "on-and-off" switch mechanism which includes manually operable means, whereby the user of the tool can control the motor.

Further features of the invention will appear during the course of the description now to be given with reference to the accompanying drawing, which drawing shows by way of example a preferred embodiment of the invention:—

Fig. 1 shows a side elevational view of a rotary tool device constructed and arranged according to the invention.

Fig. 2 is an axial sectional view of the rotary tool device shown in Fig. 1 but drawn to an enlarged scale and including certain parts in elevation, and

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1.

The main casing of this particular rotary tool

device is indicated at 4 and is adapted to enclose an electric motor consisting of a field magnet system 5 of the so-called "horse-shoe" type, which includes a yoke portion 6 upon which latter is mounted field windings carried by a bobbin 7. The motor also includes an armature element 8 carried upon a shaft 9 which is mounted in bearings 10 and 11.

The outer ring member of the bearing 10 is fixed to a plate 12 which divides the main casing 4 from a removable front portion or nose piece 13 of the tool device.

Within the compartment bounded by the inner walls of the nose piece 13 and the intermediate plate 12, there is accommodated a gear wheel 14 which is fixed to a chuck shaft 15 but is mounted in bearings 16 and 17 carried by the nose piece 13 and the intermediate plate 12 respectively, said chuck shaft 15 having mounted at its outer end a chuck 18 for holding drilling or other tools. The bearing 16 is closed at the front by means of a detachable plug 19.

The gear wheel 14 is adapted to co-operate with a correspondingly toothed portion 20 provided at the end of the motor shaft 9 for the purpose of transmitting the torque from the said shaft 9 to chuck shaft 15 and consequently to a tool held in chuck 18.

Integral with the main casing 4 there is provided the forward portion of a transversely extending handle 21 which constitutes what may be termed a "pistol-grip". This handle portion 21 provides accommodation with a tube 22 of insulating material, this tube itself carrying a metal tube 23 within which is slidably fitted a brush 24 which is adapted to co-operate with a commutator 25 of the electric motor. The end of the brush 24 is held in contact with the commutator 25 by means of a spring 26, the outer end of which abuts against a detachable cap 27 formed of insulating material. It will be obvious that by locating the brush 24 in the pistol-grip handle of the device said brush can be of comparatively great length, thus assuring highly efficient functioning of the motor and reducing the necessity of the replacement of brushes through wear, to a minimum.

It will be observed upon reference to Figs. 1 and 3 that the yoke portion 6 of the magnetic field system 5 is disposed at the opposite side of the axis of the motor to that occupied by the pistol-grip handle portion of the device, with the result that there is provided adjacent the bobbin 7 sufficient space for the accommodation of an "on-and-off" switch mechanism located in a compartment indicated at 28 and operable by

means of a "button" device 28'. In addition the arrangement also provides space for the accommodation of a further brush 24' and associated parts 22'—23'—26' and 27', and it should be noted that the brush 24' is also of comparatively great length and is conveniently accommodated without requiring any radial extension of the main casing 4 beyond that necessary for the accommodation of the field magnet system.

- 10 The main casing and the pistol-grip are completed by a removable rear portion 29 which is secured to the main casing by means of a screw 30.

The handle portion encloses a terminal block 31 to which conducting leads 32 are adapted to be coupled for connecting the device to the source of electric supply. Further connections extend from said terminal block to the brushes 24 and 24', the circuit also including the "on-and-off" switch device aforesaid. The leads 32 are conducted from the handle by way of a short tubular member 33.

The forward portion of the motor shaft 9 carries a fan wheel 34 which is adapted to rotate with the shaft and as a result of such rotation draw cooling air in through a passageway 35 formed in the pistol-grip handle portion, and opening at 37 in the base or bottom of the handle to the exterior by way of the tubular member 33 and the space between this tubular member and the rear portion 29. 38 is a further opening for the entry of air. Said cooling air is passed to the main casing 4 and through the armature tunnel, to be finally exhausted from the casing through a plurality of apertures 36 provided in spaced apart relationship around the circumference of the said casing 4. It will be appreciated that the drawing-in of cool air through the handle portion will at all times maintain said handle portion in a cool condition and thus facilitate the convenient manipulation of the device.

It is to be understood that in some cases the passageway 35 in the pistol-grip handle portion of the device may be provided with air filter means to prevent dust and other foreign matter entering the casing 4, as a result of the suction exerted by the fan wheel 34.

The invention is not limited to the precise forms or details of construction described as these may be varied to suit particular cases within the scope of the appended claims.

What I claim and desire to secure by Letters Patent of the United States of America is:—

- 55 1. A rotary tool comprising a casing having a pistol-grip handle, a chuck shaft journaled in said casing, an armature connected to said chuck shaft, said armature including a commutator, a field magnet mounted in the said casing, a brush mounted in said casing and adapted to bear on said commutator, and a second brush located within said pistol-grip handle and also bearing upon said commutator.

2. A rotary tool comprising a casing, a handle projecting transversely from said casing, a chuck shaft journaled in said casing, an armature con-

nected to said chuck shaft, said armature including a commutator, a field magnet located in said casing, and a pair of brushes bearing on said commutator, one of said brushes being located in said transversely disposed handle.

3. A rotary tool comprising a casing, a transversely disposed handle on said casing, a chuck shaft journaled in said casing and projecting therefrom, an armature, also journaled in said casing and connected to said chuck shaft, a horseshoe-shaped field magnet, the yoke of which is disposed at the opposite side of the casing to that from which the transverse handle projects, a pair of brushes bearing upon said commutator, and housings for said brushes, one of which is located within the transverse handle.

4. A rotary tool comprising a casing, a transverse pistol-grip handle at one end of said casing, a chuck shaft journaled in said casing, an armature provided with a commutator and journaled in said casing, a gear connection between said armature and said shaft, a field magnet disposed in said casing, holders for slidably accommodating a pair of brushes adapted to bear on the commutator, and means for accommodating one of said holders in the transverse pistol-grip.

5. A rotary tool comprising a casing, a transverse pistol-grip handle at one end of said casing, a chuck shaft projecting forwardly from the other end of said casing and journaled therein, an armature shaft journaled in said casing, a commutator on said armature shaft located towards the handle end of the casing, a fan towards the other end of said armature shaft, said fan being disposed adjacent air outlets in the casing, a pair of holders for slidably accommodating brushes bearing on said commutator, and means for accommodating one of said holders in the transverse pistol-grip handle.

6. A rotary tool comprising a casing, a transverse handle projecting from the end of said casing, said handle being hollow to allow the passage of air, a chuck shaft journaled in said casing, an armature shaft also journaled in said casing, a commutator on said armature shaft located towards the handle end of the casing, gearing between said armature shaft and the chuck shaft, a fan on said armature shaft, said fan being located adjacent an air port in the casing whereby air is drawn through said handle, a field magnet in said casing, a pair of brushes engaging said commutator, and a pair of holders to accommodate said brushes, one of said holders being disposed within the transverse handle.

7. A rotary electrically driven tool comprising a casing, a transverse handle projecting from one end of said casing, a horseshoe-shape field magnet located in said casing, an armature arranged eccentrically in said casing, said armature embodying a commutator, a chuck shaft, means for driving said chuck shaft from said armature, a brush co-operating with said commutator and located wholly within the housing, and a further brush located within the said transverse handle.

CHARLES DESOUTTER.