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CONNECTER FOR ELECTRIC DRILLS

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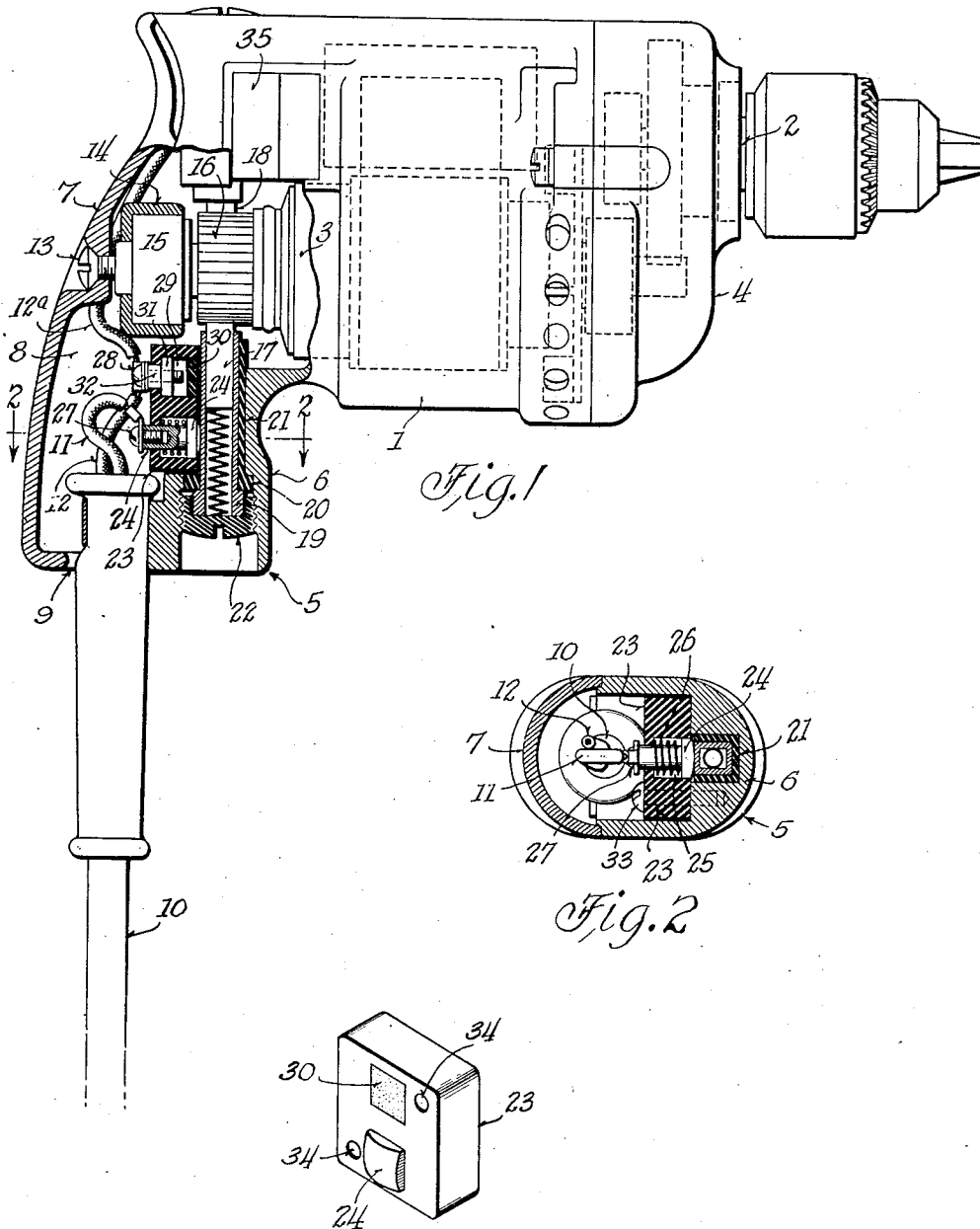


Fig. 3

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CONNECTER FOR ELECTRIC DRILLS

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4 Claims. (Cl. 172—36)

This invention relates to relatively small portable electric hand drills of the gun or pistol type.

The drill is held in and supported by one hand grasping the drill casing on opposite sides and the single handle at the rear end of the drill. The handle is of the pistol grip type and preferably made hollow to provide an air duct for the cooling system for the electric motor and to accommodate one of the brushes of the motor and the connector for electrically attaching said brush to one of the electric supply wires for the tool.

The general purpose and object of my invention is to provide an improved connector fixture and one which establishes direct connection with the metal conducting sleeve for the brush on fitting the connector in place in the hollow handle.

In carrying out the object of my invention, I expose the metal sleeve of the brush holder along the length of its insulation casing and provide the connector with a yieldable contact which directly engages the exposed portion of the metal sleeve on placing the connector in the handle.

A further object of my invention is to provide the connector with a binding screw whereby the supply wires which furnish current for the motor of the tool may be readily connected to and disconnected from the connector without disturbing the connection of the stator wire with the stator of the motor.

In the accompanying drawing illustrating one embodiment of my invention:

Fig. 1 is a side elevational view of a small portable electric hand drill provided with a connector of my invention, the handle portion of the tool being broken away and in section, respectively, to show the connector and its associated brush holder;

Fig. 2 is a sectional view taken through the handle at the connector and brush holder on line 2—2 of Fig. 1; and

Fig. 3 is a perspective view of the connector fixture removed from the tool.

In the drawing, 1 indicates the outer casing of the drill enclosing an electric motor which furnishes the power for rotating the chuck shaft or spindle 2. The motor may be of horseshoe type and arranged in the drill casing with its field coil in the upper part of the casing 1 and its armature 3 in the lower part of said casing as indicated in Fig. 1. The shaft of the armature extends into a gear case 4 at the front end of the drill and is provided with gear teeth which mesh with a gear wheel fixed on the chuck shaft 2 which is journaled in the gear case in lateral offset relation to the armature shaft, as indicated in Fig. 1.

The single handle 5 of the drill is of the pistol grip type. The handle is at the rear end of the drill and extends below the casing 1 in approximately right angular relation thereto as shown. The handle 5 is comprised of a forward part 6 preferably integral with the casing 1 and a detachable rear part 7 which provides a removable closure plate on the rear side of the handle for a compartment 8 which the handle forms with the casing 1. The handle is made hollow for this purpose and is provided at its outer or lower end with an opening 9 for the intake of cooling air for the motor and to receive the cable 10 containing the electric supply wires 11, 12 for the drill. A part of the opening 9 is embodied in the cover plate 7 whereby the cable may be readily applied to and removed from the drill on taking off the cover.

The cover plate 7 is removably secured in place by a screw 13 which takes into a cup support 14 for the bearing 15 for the rear end of the armature shaft of the motor. Bearing support 14 is carried by the drill case 1. The forward end of the armature is journaled in the gear case 4.

The commutator 16 of the motor is between the armature 3 and the bearing 15. The brushes 17, 18 for the motor engage the commutator 16 and these brushes are located, one in the casing 1 above the commutator and the other in the handle part 6 below the commutator.

Each brush is slidably mounted in a metal supporting tube or sleeve 19. The sleeve has a tight fit in a holder 20 of suitable electrical insulating material. The holder 20 encloses all sides of the metal sleeve except one. The brushes are urged against the commutator by springs, one in each metal sleeve.

The lower brush assembly is mounted in a bore or passage 21 in the handle part 6 and said passage is closed at this lower end by a screw plug 22 which secures the lower brush holder in place in the handle. This plug is of electrical insulating material and clamps the outer end of the holder 20 against a shoulder in the handle part 6 as shown in Fig. 1. The passage 21 is open along one side into the compartment 8 and the brush holder 20 is so mounted in this passage that the exposed part of its metal tube 19 is exposed along the open side of the passage as shown in Fig. 2.

Also located in the compartment 8 adjacent the lower brush holder is a connector comprising an insulating body part 23 which extends across the space between the side walls of the compartment as shown in Fig. 2. The body part 23 is

provided with a contact member 24 slidably mounted in a recess or chamber 25 in the connector body as shown. The chamber 25 opens through the side of the connector body opposed to the exposed wall of the metal tube 19 where-
 5 by the contact member 24 may readily engage the metal tube. A coil spring 26 located in the recess urges the contact member toward the tube. The contact member at this point has an enlarged
 10 head to seat the spring and also bear against the metal tube.

The shank of the contact member 24 extends out of the recess through an opening in the connector body at the bottom of the recess and is provided at its outer end with a binding screw
 15 27 for connecting the wire 11 to the contact member. The head of the contact member 24 and the chamber 25 are non-circular and interfit to hold the contact member against turning. The
 20 contact member 24 is located adjacent the lower edge of the connector body, as shown.

The connector body also carries a binding screw 28. This screw is above the contact member 24 and extends into a chamber 29 in the connector
 25 body above the chamber 25. The chamber 29 opens through the same side of the connector body as the chamber 25 and is normally closed at its outer end by an insulating plug or washer
 30 30. The latter fits tightly in the chamber 29 and is preferably flush with the associated outer surface of the connector body so as not to project beyond the same to prevent the contact member
 35 24 reaching the metal tube 19. Fitted in the chamber 29 is a nut 31 with which the screw 28 engages. The nut 31, by its fit in the chamber
 40 29, is held against turning and has a tubular portion 32 which extends out of the chamber to the side of the connector body opposite the insulating plug 30. The outer end of this tubular
 45 portion 32 provides a seat for the head of the screw 28 and enables the screw to clamp together the metal terminals at the adjacent ends of the wires 12 and 12a. The latter wire leads
 50 to the stator of the motor and being separate from the wire 12 enables the binding screw arrangement to provide an easy means by which a
 55 new cable may be connected to the tool.

The connector 23 is preferably fastened in place in the compartment 8 by one or more screws 33
 60 extended through openings 34 in the connector body and entering tapped holes in the handle part 6 as shown in Fig. 2.

The advantages of the connector construction shown and described are: The use of a contact
 65 member 24 which bears directly against the metal tube 19 of the lower brush holder enables an electrical connection to be made with the brush on merely inserting the connector in the handle and
 70 securing it in place. No wires or binding screws are required as heretofore. Moreover, exposing the metal tube of the brush holder along the length of the holder enables the contact to be
 75 made without accurate spotting or setting of the contact means. Also the contact being yieldable, compensates for clearances between the parts. Also, the screws 33 when tightened do not exert any strain on the metal sleeve 19 to distort it or interfere with the free movement of the brush 17 therein. The binding screw 28 enables a separate wire to be used as the stator wire and thus the wires of the cable 10 may be readily and easily connected to and disconnected from the connector fixture without disturbing the connection of the stator wire 12a with the stator of the

motor. The insulating plug 30 prevents the binding screw 28 dropping out of the chamber 29 when the connector is removable from the tool and also this plug prevents the screw 28 contacting the conducting tube 19 of the lower brush
 5 holder when applying and removing a cable for the tool.

The switch device for the motor is indicated at 35. This device connects the upper brush with the field coil, and is thumb operated to turn on
 10 and off the current to the motor. The switch device and its manner of electrical connection with the upper brush holder and the field coil of the motor, respectively, constitute the subjects-matter of the co-pending applications of Frithiof P.
 15 Forss, Serial No. 45,541 and Frank B. Hamerly, Serial No. 45,544, both filed October 18, 1935.

The details of construction and arrangement of parts shown and described may be variously
 20 changed and modified without departing from the spirit and scope of my invention, except as set forth in the appended claims.

I claim as my invention:

1. In a portable electric tool, an outer casing, an electric motor therein, a hollow handle at one
 25 end of the casing and extending outwardly therefrom in transverse relation to the axis of rotation of the motor, a brush holder in the handle, a spring biased brush for the motor in the holder, said holder having a metal tube supporting the
 30 brush and exposed along its side facing the compartment formed by the hollow handle, a connector secured in the handle and having a contact member directly engageable with the exposed
 35 side of the metal tube on inserting the connector in the handle, and means for connecting a supply wire to said contact member.

2. In a portable electric tool, an outer casing, an electric motor therein, a hollow handle at one
 40 end of the casing and extending outwardly therefrom in transverse relation to the axis of rotation of the motor, a brush holder in the handle, a spring biased brush for the motor in the holder, said holder having a metal tube supporting the
 45 brush and exposed along its side facing the compartment formed by the hollow handle, a connector secured in the handle and having a spring pressed contact member slidably mounted in the connector and directly engageable at
 50 one end with the exposed side of the metal tube on inserting the connector in the handle, and means for connecting a supply wire to the opposite end of said contact member.

3. In a portable electric tool of the character described, an outer casing, an electric motor
 55 therein, a hollow handle at one end of the casing and extending outwardly therefrom in transverse relation to the axis of rotation of the motor, a brush holder in the handle, a spring biased brush for the motor in said holder, said holder having a metal tube supporting the brush and
 60 exposed along its side facing the compartment formed by the hollow handle, a connector having a spring pressed contact member engageable with the exposed side of the metal tube on inserting the connector in the handle, means for
 65 connecting a supply wire to said contact member, and a binding screw carried by the connector for the other supply wire.

4. In a portable electric tool of the character described, an outer casing, an electric motor
 70 therein, a hollow handle at one end of the casing, a brush holder in the handle, said holder having an outer case of insulating material seated in a passageway in the handle and a metal tube
 75

in said case, a spring biased brush for the motor in said tube, said casing being open along one side to expose the metal tube to the compartment formed by the hollow handle, a connector 5 in the handle over the holder at the exposed side of the tube, means for securing the connector in the handle beyond the sides of the holder, a spring pressed contact member slidably mounted in the connector and directly engageable at one end with the exposed side of the tube, and means at the other end of the contact member for connecting a supply wire thereto. 5

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