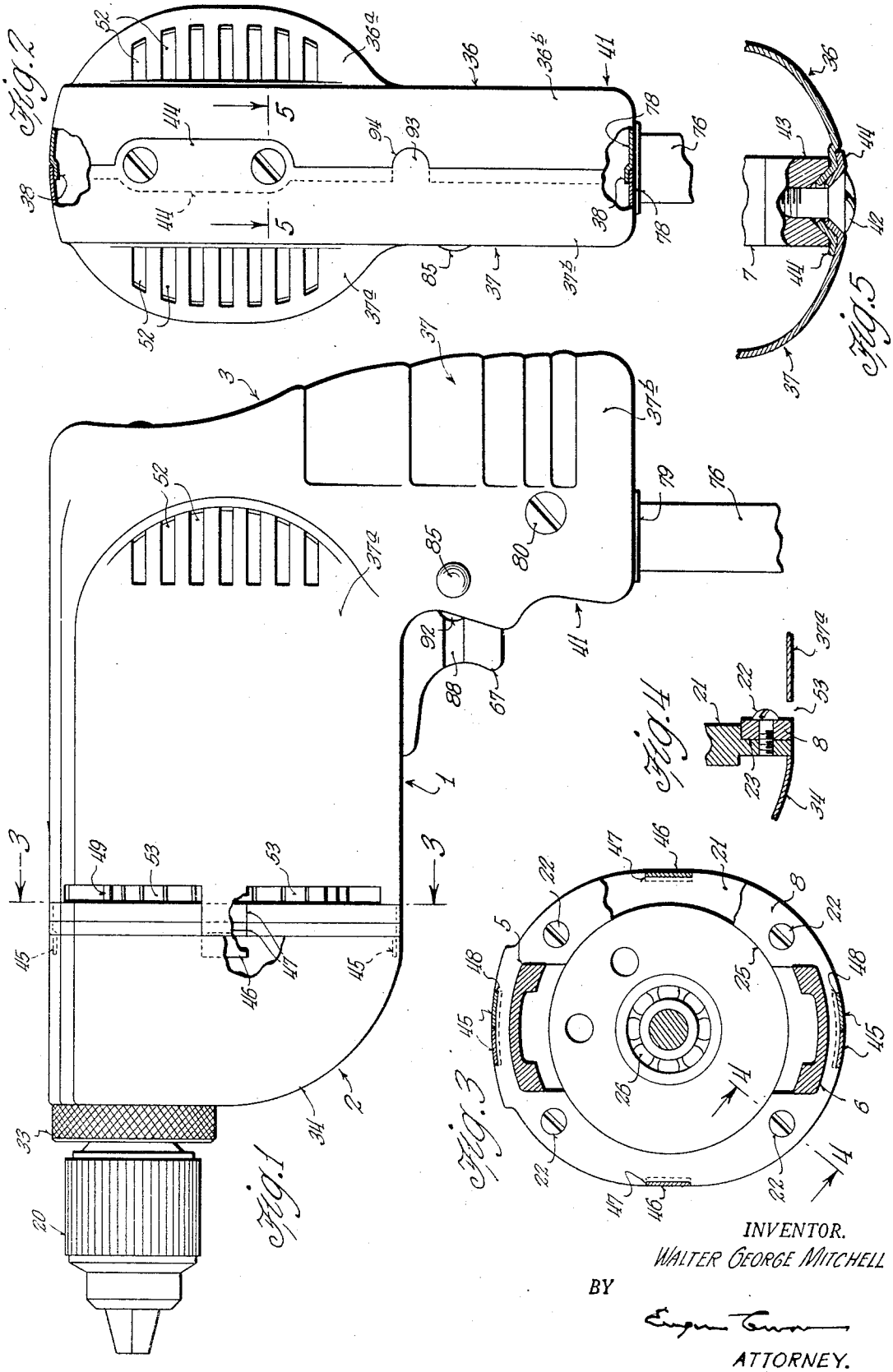
April 18, 1944. W. G. MITCHELL 2,346,778

PORTABLE HAND HELD ELECTRIC TOOL

Filed Oct. 16, 1942 3 Sheets-Sheet 1

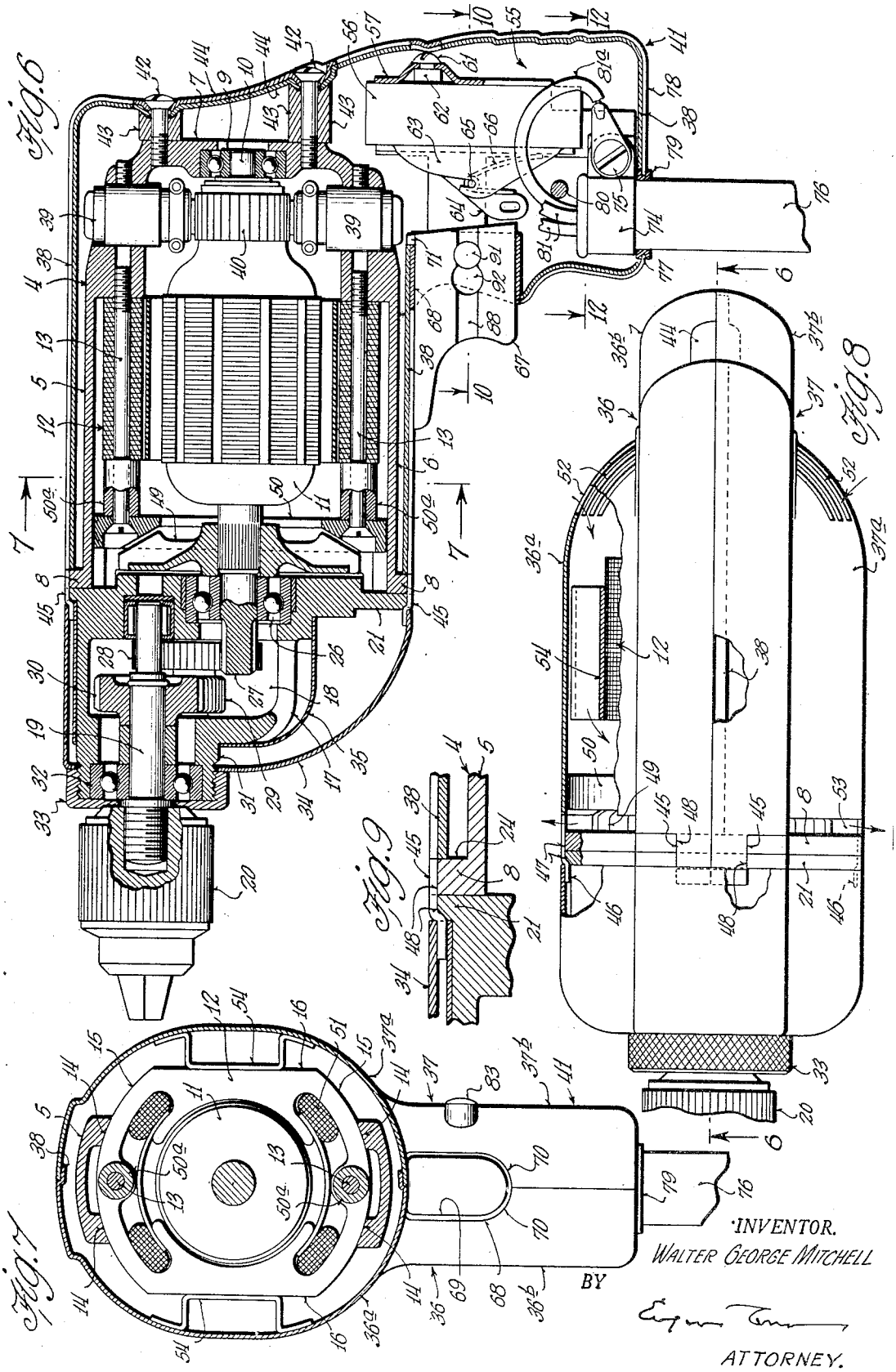


INVENTOR.
WALTER GEORGE MITCHELL
BY
ATTORNEY.

April 18, 1944. W. G. MITCHELL 2,346,778

PORTABLE HAND HELD ELECTRIC TOOL

Filed Oct. 16, 1942 3 Sheets-Sheet 2



INVENTOR.
WALTER GEORGE MITCHELL
BY
ATTORNEY.

April 18, 1944. W. G. MITCHELL 2,346,778

PORTABLE HAND HELD ELECTRIC TOOL

Filed Oct. 16, 1942 3 Sheets-Sheet 3

Fig. 11

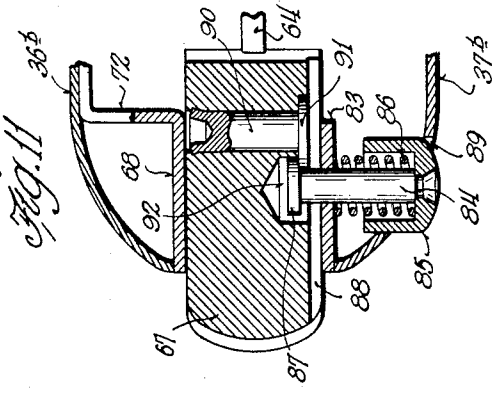


Fig. 15

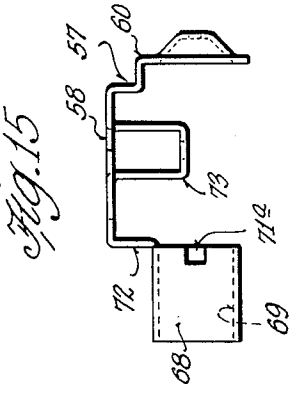


Fig. 10

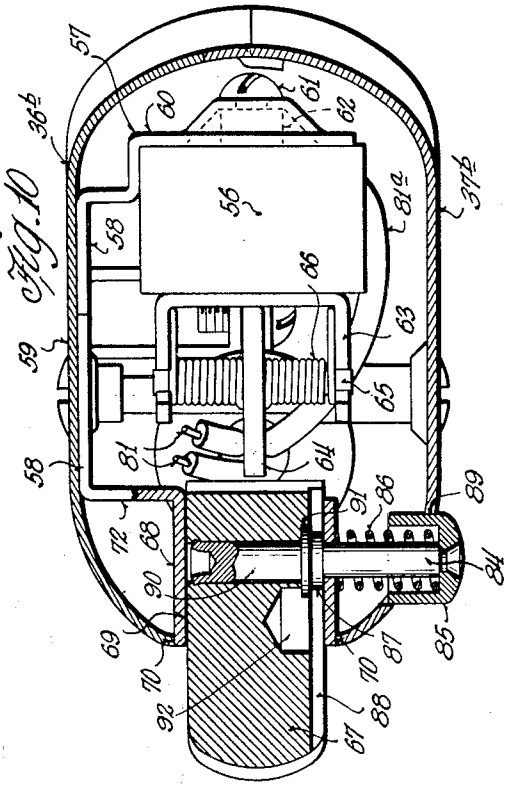


Fig. 14

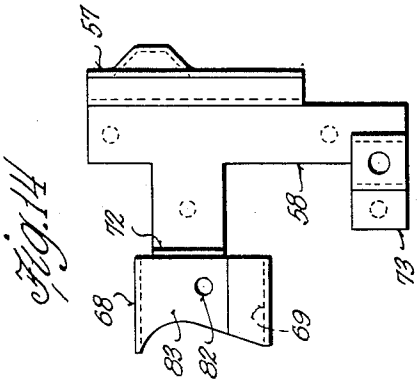


Fig. 13

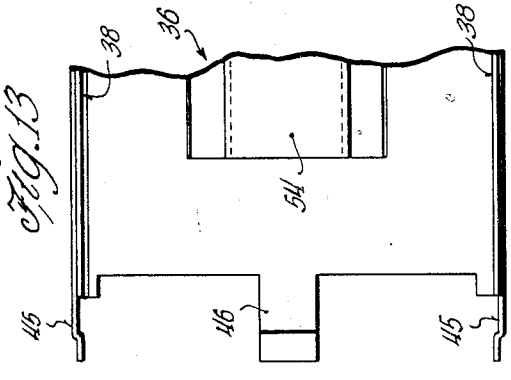
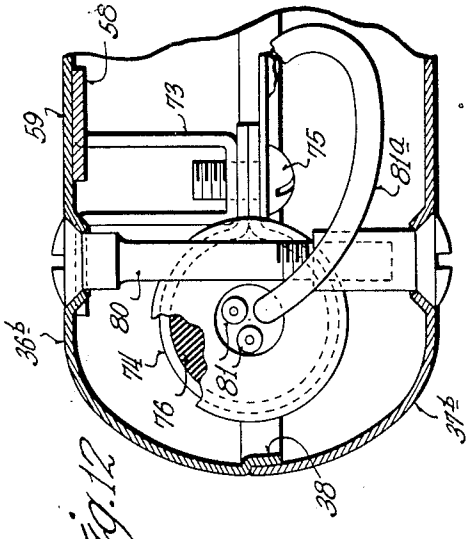


Fig. 12



INVENTOR.
WALTER GEORGE MITCHELL

BY

ATTORNEY.

Patented Apr. 18, 1944 2,346,778

UNITED STATES PATENT OFFICE

2,346,778

PORTABLE HAND HELD ELECTRIC TOOL

Walter George Mitchell, Aurora, Ill., assignor to Independent Pneumatic Tool Company, Chicago, Ill., a corporation of Delaware

Application October 16, 1942, Serial No. 462,245

14 Claims. (Cl. 172—36)

In my co-pending application Serial No. 462,244, filed October 16, 1942, I have shown and claimed a portable hand held electric drill or similar tool adapted for industrial purposes and having a sturdy skeleton metal frame supporting the tool motor and the spindle and the tool housing and its handle made of a plastic material to give lightness in weight and compactness to the tool for ease in handling and balance in one hand and use over extended periods in production work without unduly tiring the operator holding the tool.

The general purpose and object of my invention is to provide a tool of the character referred to in which the housing consists of sheet metal sections of the required size and shape, preferably of comparative light gauge sheet steel, to protect and enclose the operative parts of the tool and withstand wear to a better advantage than the plastic material and to provide the tool with a metal housing and handle member.

In accordance with my invention the housing cover for the motor and the frame and the handle at the rear end of the tool are in the form of separable half sections divided longitudinally of the tool to facilitate and cheapen their manufacture and provide for the convenient connecting of the switch device for the motor with the motor circuit and the supply cable in assembling the tool by having the switch device supported by one of the handle sections independently of the supply cable.

A further object of my invention is to provide the motor cover sections of the housing with integral tongues at their front ends to interlock with notches in flange formations on the frame and the gear casing, respectively, to hold the cover sections in connected relation with said frame and casing, the cover section over the casing overlapping the forward ends of said tongues.

A further object of my invention is to have the bracket which supports the switch device within the tool handle secured to one of the handle sections to facilitate mounting the switch device with the handle and connecting its terminals with the motor circuit and the leads of the supply cable before the handle sections are brought into closing and handle forming relation in assembling the tool.

A further object of my invention is to provide the bracket with an opening or way to slidably mount the trigger block which operates the switch device from the exterior of the handle so that the entire switch device including the trigger block may be assembled on one handle section before it is closed thereover.

A further object of my invention is to have the locking plunger for the trigger block supported by the portion of the bracket which slidably mounts the trigger block so that the lock may be assembled in the switch unit before closing the handle sections.

Other and further objects of my invention will appear from the following specification taken in conjunction with the accompanying drawings in which—

Fig. 1 is a side elevational view of a portable hand held electric drill constructed in accordance with my invention;

Fig. 2 is a rear end view of the tool with portions of the handle sections broken away and in section, respectively, to show the overlapping flange connection therebetween;

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 1 to show the interfitting tongues and notches to be hereinafter described;

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 3 to show a detail of construction;

Fig. 5 is a similar sectional view taken on line 5—5 of Fig. 2 to show a further detail of construction;

Fig. 6 is a longitudinal sectional view of the tool with parts in section and elevation, respectively, said section being taken on line 6—6 of Fig. 8;

Fig. 7 is a cross-sectional view taken on line 7—7 of Fig. 6;

Fig. 8 is a top plan view of the tool with the outer housing broken away and in section, respectively, to show in particular the laterally disposed tongues at the forward end of the cover sections for the tool motor;

Fig. 9 is an enlarged fragmentary sectional view at one of the tongues to more clearly show the interlock of the latter with the associated flange or wall members on the gear case and the motor supporting frame, respectively;

Fig. 10 is a cross-sectional view with parts in elevation taken on line 10—10 of Fig. 6 to show the switch device for the tool motor and its operation trigger block, the latter being shown in its normally outwardly projected position;

Fig. 11 is a similar view of the trigger block and its locking plunger, the latter being shown in locking engagement with the trigger block for holding the switch closed;

Fig. 12 is a horizontal sectional view with parts in elevation taken on line 12—12 of Fig. 6 to show

the cable clamp and the ground connection thereof with the switch supporting bracket within the tool handle;

Fig. 13 is a fragmentary side view of one of the half sections of the tool housing to show the locking tongues thereon;

Fig. 14 is a side view of the switch supporting bracket removed from the tool; and

Fig. 15 is a top plan view of said bracket.

In the drawings, I have shown a portable hand held electric drill of the pistol grip type having a motor section 1, a reducing gear section 2 and a handle section 3. These sections are secured together in the assembled relation shown and contain the operative parts of the tool. In the embodiment illustrated, the housing for the tool comprises cover and handle sections in the form of sheet metal stampings, as before mentioned, to give the tool lightness in weight and compactness in size for balance and ease of handling in one hand over extended periods in production work without fatigue to the operator using the tool. Moreover, the comparative light gauge sheet metal housing may replace the now restricted aluminum casings heretofore employed for these tools, while retaining the tool relative small, light in weight and of the full power of the previous tool.

The support for the tool motor comprises an integral U-shaped, study skeleton metal frame 4 having substantially parallel arm portions 5, 6 rigidly connected at the opposite ends of the frame by end walls 7, 8, the same as disclosed and claimed in my co-pending application aforesaid. As defined in said application and as shown herein, the end wall portion 7 of the frame provides a support for the ball bearing unit 9 for the rear end of the armature shaft 10 of the rotor 11 of the tool motor. The latter has a stator 12 fitted within the frame arms 5, 6 and secured thereto by fastening screws 13, 13 as shown in Fig. 6.

The stator 12 has a rotative connection with the frame arms 5, 6 in the manner described and claimed in said co-pending application. Briefly, this connection is depicted in Fig. 7 herein and comprises arcuate surfaces 14, 14 on the frame arms to engage the complementary curved edges 15, 15 of the stator plates having flat side edges 16, 16 which when turned into opposition to the frame arms allow for the lateral shifting of the stator into and out of the frame 4 through either of its open sides in assembling and disassembling of the stator with respect to the frame.

The reducing gear section 2 of the tool comprises a gear casing 17 providing a chamber 18 to accommodate the gear train which drives the tool spindle 19 from the motor shaft 10. The spindle 19 is journaled within the gear casing 17 and is equipped at its outer end with a chuck 20 as shown. The gear casing 17 is a metal casting in one piece and has its rear end wall 21 conforming with and secured to the front wall member 8 of the motor supporting frame 4 by screws 22 as shown in Figs. 3 and 4. As shown in Fig. 4, the rear face of the wall 21 is recessed at 23 to seat the frame wall 8. As in my said co-pending application, the wall 8 has a ring formation integral with the outer ends of the frame arms 5, 6 and extends on opposite sides thereof to provide a seating surface on its front face for the casing wall 21 and a shoulder 24 on its rear side for the front edges of the cover sections for the tool motor. The frame ring 8 also has a center opening 25 to receive the interfitting part of the casing wall 21 and to pass the armature shaft 10 and rotor 11.

The motor shaft 10 extends into the chamber 18 through the gear case wall 21, the latter supporting a ball bearing unit 26 for the front end of said shaft 10 as shown. The gear train comprises a pinion 27 on the shaft 10 in mesh with an intermediate gear wheel 28 driving a pinion 29 which meshes with a gear wheel 30 on the spindle shaft 19. The gear case 17 has a tubular extension 31 at the front end of the tool to mount the spindle 19 and its ball bearing 32. The outer end of the extension 31 is externally screw threaded to mount a screw cap 33 which engages over the bearing unit 32 to hold the latter in place and to clamp the sheet metal cover section 34 over the gear housing 17 and against the front face of its end wall 21. The gear housing 17 mounts a shield member 35 to retain lubricating grease within the chamber 18 for the gears as described and claimed in my other co-pending application Serial No. 475,367, filed February 10, 1943.

The part of the housing providing the motor cover and the handle for the tool comprises a pair of separable half sections 36, 37 divided longitudinally of the tool and each including an integrally connected half of the cover and the handle, respectively. In short, each half section 36, 37 is a one-piece metal stamping forming one half of the motor cover and the adjoining half of the tool handle as shown. For reference purposes, the cover halves are marked 36*a*, 37*a* and the handle halves are marked 36*b*, 37*b*, respectively. These halves when assembled fit along their longitudinal edges, the half section 36 having a marginal flange 38 overlapping the other half 37 from the inside as shown in Fig. 2.

As shown in the drawings, the combination cover and handle sections 36, 37 are shaped to conform to the tool parts which they respectively cover and provide, the cover sections 36*a*, 37*a* being in bulged form to enclose the motor and its supporting frame 4. The handle sections 36*b*, 37*b* are channeled shaped in cross-section to enclose the rear end of the frame 4 and the motor brushes 39, 39 carried thereby for the motor commutator 40 as indicated in Fig. 6. The handle sections 36*b*, 37*b* are also shaped to provide a hollow depending pistol grip portion 41 for the tool extending below the motor covers 36*a*, 37*a* and the frame 4 as shown. The handle sections of the tool are secured to the frame wall 7 by screws 42, 42. The latter mount spacers 43 interposed between the frame wall 7 and the rear walls of the handle sections. At the screws 42, the wall sections of the handle members 36*b*, 37*b* are dished as at 44, 44 to countersink the screws 42 and interfit in recesses provided in the associated spacers.

The front edge of each cover section 36*a*, 37a is provided with forwardly extending integral tongues 45, 46, all of the same length or substantially so, and equally spaced on the respective sections. These tongues engage over the wall members 8 and 21 and fit in registering notches 47, 48 therein as shown in Figs. 1, 2, 8 and 9. The side tongues 46 fit in the side notches 47, while the upper and the lower tongues 45 fit in the upper and the lower notches 48. In this respect, the upper and the lower tongues on the two cover sections 36, 37 fit together in side by side relation and the notches 48 are wide enough

to receive them as detailed in Fig. 8. The notches in the wall members 8 and 21 are peripheral notches to readily receive the tongues in assembling the parts and to have the tongues hook over the wall member 21 as shown in Fig. 9. The tongues are held in place by their resiliency and the over-lapping of the front cover 34. The latter is inserted in place over the front end of the tool after the side sections 36, 37 are applied. The wall members 8 and 21 provide the flange formations for the tongues as expressed in the claims.

The tool contains a rotary fan element 49 splined on the motor shaft 10 within the cover sections 36, 37 of the housing. The screws 13 carry a baffle ring 50 which provides the rear side of the fan chamber and fitting against the inner side of the cover sections 36, 37 deflects the incoming air to the center intake of the fan as indicated by the arrows in the drawings. Spacer sleeves 50*a*, 50*a* on the screws 13 dispose the baffle plate 50 forwardly of the front loops (not shown) of the stator winding 51. The fan 49 is rotated by the tool motor and creates a flow of air over the motor to cool the same. The air flow is from the rear to the front of the tool, the handle and the cover sections 36, 37 having air intake and discharge opening therein for the fan. The intake openings 52 are in the cover sections 36*a*, 37*a* adjacent to the handle sections, while the discharge openings 53 are at the front end of the cover sections at the periphery of the fan in the form of slots between the tongues as shown.

The cover sections 36*a*, 37*a* have inside metal channels 54, 54 spot-welded thereto to hold the stator 12 in place and to provide for an air flow at the sides of the motor.

The handle sections 36*b*, 37*b* provide a chamber 55 within the grip portion 41 of the handle to accommodate the switch device 56 for the motor and its supporting bracket 57. The latter is fashioned of sheet steel in the form shown in Figs. 14 and 15, and from which it will be noted that the bracket has an upright wall 58 extending the full height of the bracket and spot-welded to the flat side wall 59 of the handle section 36*b* as shown in Fig. 11. The bracket wall 58 has a side flange 60 shaped to fit in part about the switch device 56 and secured thereto by a screw 61 threaded into a tapped boss 62 on the rear side of the switch case. The latter carries a superstructure 63 on its front side mounting a switch actuating lever 64 on a fulcrum rod 65 about which is a coiled spring 66 which normally moves the free end of the lever forwardly. The lever 64 is of the bell-crank type having one arm co-acting with the spring actuated switch mechanism to close the switch and supply an operating current to the tool motor when the lever is moved inwardly. On the release of the lever, the switch action automatically opens the switch to stop the motor and returns the outer end of the lever 64 to its outermost position as shown in Figs. 6 and 10. The switch device is of a conventional type obtainable on the market.

The trigger block 67 for closing the switch is slidably mounted at the pistol grip portion 41 of the tool handle on the front side thereof just below the motor section 1 as shown herein. To support the trigger block 67, the bracket 56 has a front flange formation 68 providing a rectangular opening or slide-way 69. The formation 68 extends to the outer walls of the handle sections 36*b*, 37*b*, the latter having cut-out portions 70, 70 on the opposite sides of their line of division to provide an opening for the trigger block 67 as shown in Figs. 6, 10 and 11. The trigger block may be either a solid or a cored metal member rectangular in shape to fit, without turning, within the slide-way 69. The trigger block 67 is engaged at its inner end with the lever 64, the actuating spring 66 of which normally projects the trigger block outwardly for accessibility exterior of the handle. A lug 71 on the upper inner end of the trigger block 67 takes into a notch 71*a* in the bracket section 68 to limit the outward projection of the trigger block by the spring 66 and to hold the trigger block from dropping out of the handle. The front end of the trigger block is curved to fit the operator's finger and the slide-way 68 of the bracket 56 is connected with the upright wall 58 by an intervening flange portion 72.

At the lower end of the bracket 56 is provided an inwardly extending integral portion 73 providing a foot for the bracket within the tool handle and an anchoring lug for the cable clamp 74. The latter is in the form of a split band and is secured to the lug 73 by a screw 75 as shown in Fig. 12. The cable 76 is embraced by the band 74 within the handle chamber 55, the cable extending into said chamber through an opening 77 in the closing end wall portions 78, 78 of the handle sections 36*b*, 37*b* at the lower or butt end thereof. A protecting grommet 79 is fitted about the cable within said opening. The latter has an equal part in each end wall portion 78, 78 on opposite sides of their meeting edges.

The handle sections 36*b*, 37*b* at the pistol grip 41 are rigidly connected in the assembled tool by a cross-bolt 80 as shown in Fig. 12. The cable 76 contains the supply leads 81, 81 for the motor circuit and the ground lead 81*a*. The latter is connected to the foot end 73 of the bracket 56 by the cable clamp screw 75. This grounds the motor through the cable and protects the operator holding the tool from shocks due to accidental grounding of the motor circuit without the need and expense of housing the tool wholly in insulating material or insulating the motor from the sheet metal housing sections.

The slide-way formation 68 of the bracket 56 has an aperture 82 on its side wall 83 opposite to the wall 58 to mount a locking plunger 84 for the trigger block 67. The plunger carries a push button 85 at is outer end and is biased outwardly by a spring 86. The latter normally keeps the inner headed end 87 of the plunger in a longitudinal groove 88 in the adjacent side portion of the trigger block 67. The button 85 works through an opening 89 in the handle section 37*b* for accessibility from the exterior of the tool.

The trigger block 67 carries a cross-pin 90, the headed end 91 of which overhangs a recess 92 in the trigger block at the groove 88 as shown in Figs. 10 and 11. Depressing the trigger block to close the switch 56 brings the head 87 of the plunger 84 into register with the recess 92, whereupon, if desired, the operator may press the plunger into said recess. The plunger is now out of the path of the cross-pin 90 and may be pressed into said recess. When this has been done, the operator releases the inward pressure on the trigger block 67 and the switch lever spring 66 projects the trigger block forwardly bringing the head 91 of the cross-pin 90 over the headed inner end of the plunger holding

both depressed and the switch closed for continued running of the tool motor. Pressing inward on the trigger block 67 releases the plunger 84 and its spring 88 projects the plunger outwardly whereupon the trigger block when released will be projected to its outermost position to open the switch and stop the motor which is the normal condition of the tool.

The handle section 37b has a rear tongue formation 93 to close a notch 94 in the matching handle section 36b when the parts are assembled. This recess 94 provides for access to the switch holding screw 61 when securing the switch case to the bracket 56 after welding the latter in place.

In assembling the tool, the motor and spindle mechanism are mounted in respect to the frame 4, whereupon the handle and cover section 37 mounting the switch device 56 and the bracket 57 is brought sufficiently close to the frame and motor assembly so that the brush leads from the motor may be connected to the short wires fixed to the top terminals of the switch case. Then the cable 76 has its supply and ground leads secured to the lower terminals of the switch case and to the bracket, respectively. This completes the motor circuit and the other housing section 36 is applied to enclose the assembled parts. The screws 42 are then applied and the front cover 34 is secured in place over the tongues 45, 46 to finish the job.

The tool shown and described has the power required for industrial uses and with a supporting frame 4 and sheet metal covers may be kept light in weight and sufficiently small in size to be held and manipulated in one hand without undue tire to the operator over extended periods. The tool due to its construction and design is strong, sturdy and efficient for drilling and kindred operations.

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

I claim as my invention:

1. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle and having a flange formation at the front end of the frame, a housing for the tool having a cover section about the motor and the frame and a handle at the rear end of the tool, said handle being secured to the rear end of the frame and holding the cover in enclosing relation about the motor and the frame, said cover having forwardly extending tongues at its front end fitting over the flange formation on the frame for holding the cover in connected relation therewith, and a switch device for the motor carried by and operable from the exterior of the handle.

2. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle and having a peripherally notched flange formation at the front end of the frame, a housing for the tool having a cover about the motor and the frame and a handle at the rear end of the tool, said handle being secured to the rear end of the frame and holding the cover in enclosing relation about the motor and the frame, said cover having forwardly extending tongues at its front end fitting over the flange formation on the frame in the peripheral notches therein, means carried by the frame and overlapping the tongues for holding the same in said notches, and a switch device for the motor carried and operable from the exterior of the handle.

3. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle and having a flange formation at the front end of the frame, a housing for the tool having a cover about the motor and the frame and a handle at the rear end of the tool, said cover and handle being comprised of separable half sections in the form of sheet metal stampings divided longitudinally of the tool, said handle sections being secured to the rear end of the frame and the cover sections having forwardly extending tongues engaging over the flange formation on the frame, means carried by the frame and overlapping the tongues for holding the same in connected relation with the frame, and a switch device for the motor carried by and operable from the exterior of the handle.

4. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle and having a peripherally notched flange formation at the front end of the frame, a housing for the tool having a cover about the motor and the frame and a handle at the rear end of the tool, said cover and handle being comprised of separable half sections in the form of sheet metal stampings divided longitudinally of the tool, said handle sections being secured to the rear end of the frame and the cover sections having forwardly extending tongues engaging over the flange formation on the frame in the notches therein, a front cover for the spindle carried by the frame and overlapping the tongues for holding the same in said notches, and a switch device for the motor carried by and operable from the exterior of the handle.

5. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle and having a peripherally notched flange formation at the front end of the frame, a housing for the tool having a cover about the motor and the frame and a handle at the rear end of the tool, said housing being comprised of separable half sections in the form of sheet metal stampings divided longitudinally of the tool, said handle sections being secured to the rear end of the frame and the cover sections having forwardly extending tongues engaging over the flange formation on the frame in the notches therein, a fan element within the cover and driven by the motor for cooling the same, intake and discharge openings for the fan in the handle and cover sections, respectively, the intake openings being disposed towards the rear end of the motor and the discharge openings being in the form of slots in the front edges of the cover sections between the tongues thereon, and a switch device for the motor carried by and operable from the exterior of the handle.

6. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle, a housing for the tool having a cover about the motor and the frame and a handle at

the rear end of the tool, said housing being secured to the frame and comprised of separable half sections in the form of sheet metal stampings divided longitudinally of the tool, said handle having a hollow depending pistol grip portion extending below the cover and the frame, a switch device for the motor mounted within the grip portion of the handle, and a trigger block slidably mounted with respect to the forward part of the handle below the cover and the frame for operating the switch device.

7. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle, a housing for the tool secured to the frame and having a cover about the motor and the frame and a handle at the rear end of the tool, said housing being comprised of a relatively light self-sustaining material supported by the frame and having a hollow depending pistol grip portion for the handle extending below the cover and the frame, a switch device for the motor located within the grip portion of the handle, a bracket therein to support the switch device, and a trigger block slidably carried by the bracket and accessible from the exterior of the handle for operating the switch device.

8. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle, a housing for the tool secured to the frame and having a cover about the motor and the frame and a handle at the rear end of the tool, said housing being comprised of a relatively light self-sustaining material supported by the frame, said handle having a hollow depending pistol grip portion extending below the cover and the frame, a bracket secured within the grip portion of the handle and having a forwardly extending portion to provide a slide-way, a switch device supported within the handle by said bracket, and a trigger block mounted in said slide-way for operating the switch device.

9. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle, a sheet metal housing for the tool having a cover about the motor and the frame and a handle at the rear end of the tool, said handle being secured to the rear end of the frame and having a hollow depending pistol grip portion extending below the cover and the frame, a switch device for the motor located within the grip portion of the handle, a bracket supporting the switch device within the handle and secured thereto, and a trigger block and a supply cable for the tool, both extending into the handle, for operating the switch device and supplying a power current to the motor, respectively, said cable having a ground lead connected to said bracket and the latter having a slide-way to support the trigger block.

10. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle, a housing for the tool carried by and secured to the frame and comprised of separable half sections in the form of sheet metal stampings divided longitudinally of the tool and providing a cover about the motor and the frame and a handle at the rear end of the same, the handle sections providing a hollow depending pistol grip portion extending below the cover and the frame and having upright walls, a switch device for the motor located within the grip portion of the handle, a bracket therein to support the switch device and secured to one of the handle sections, a trigger block for operating the switch device and extending into the handle through an opening therein, one half of said opening being in each wall section, said bracket having a slide-way to support the trigger block, and a supply cable for the motor extending into the handle at the lower end of the bracket and clamped thereto.

11. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle, a housing for the tool secured to the frame and comprised of separable half sections in the form of sheet metal stampings divided longitudinally of the tool and providing a cover about the motor and the frame and a handle at the rear end of the tool, the handle sections providing a hollow depending pistol grip portion extending below the cover and the frame and having closing end walls at the butt end of the handle, a switch device for the motor located within the grip portion of the handle, a bracket secured therein to support the switch device, a trigger block slidably carried by the bracket to operate the switch device, and a supply cable for the motor extending into the handle at the lower end of the bracket and clamped thereto, the butt end of the handle having an opening for the cable formed in part in each of the closing end walls of the handle sections.

12. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle, a housing for the tool mounted on and secured to said frame and having a cover about the motor and the frame and a handle at the rear end of the tool, said handle having a hollow depending pistol grip portion extending below the cover and the frame, a switch device for the motor located within the grip portion of the handle, a bracket supporting the switch device within the handle and having an extension forming a slideway, a trigger block at the handle for operating the switch device and carried by the bracket in said slideway, and a spring biased plunger carried by the slideway and cooperating with the trigger block for releasably locking the same in switch closing position.

13. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame within the tool providing a support for the motor and the spindle, a housing for the tool carried by and secured to the frame and comprised of separable half sections in the form of sheet metal stampings divided longitudinally of the tool and providing a cover about the motor and the frame and a handle at the rear end of the tool, the handle sections providing a hollow depending pistol grip portion extending below the cover and the frame, a switch device for the motor located within the grip portion of the handle, a bracket secured therein to support the switch device, a trigger block for operating the switch device and carried by the bracket, and a cross-member within the handle and engaged with the half sections

thereof for securing the same together at the switch device.

14. A portable hand held electric tool having a rotatable spindle and an electric motor for driving the same, a skeleton metal frame and a casing within the tool respectively supporting the motor and the spindle, said casing and the frame being secured together at the front end of the frame and having registering peripheral notches therein, a housing for the tool having a handle at the rear end of the tool and a front cover for the casing and a motor cover about the motor and the frame, the handle being secured to the rear end of the frame and the motor cover having forwardly extending tongues engaging in the registering notches in the casing and the frame, said front cover being secured to the casing and overlapping the tongues for holding the same in said notches, and a switch device for the motor carried by and operable from the exterior of the handle.

WALTER GEORGE MITCHELL.