

[54] **DOUBLE INSULATED PORTABLE SANDER**

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[58] Field of Search **51/170 MT**

[56] **References Cited**

UNITED STATES PATENTS

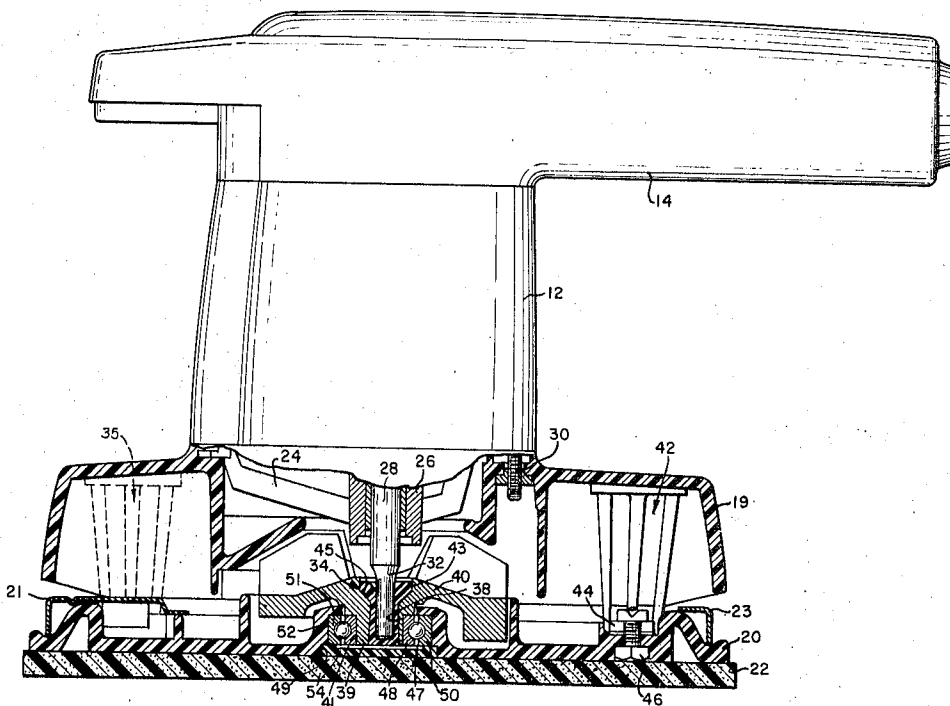
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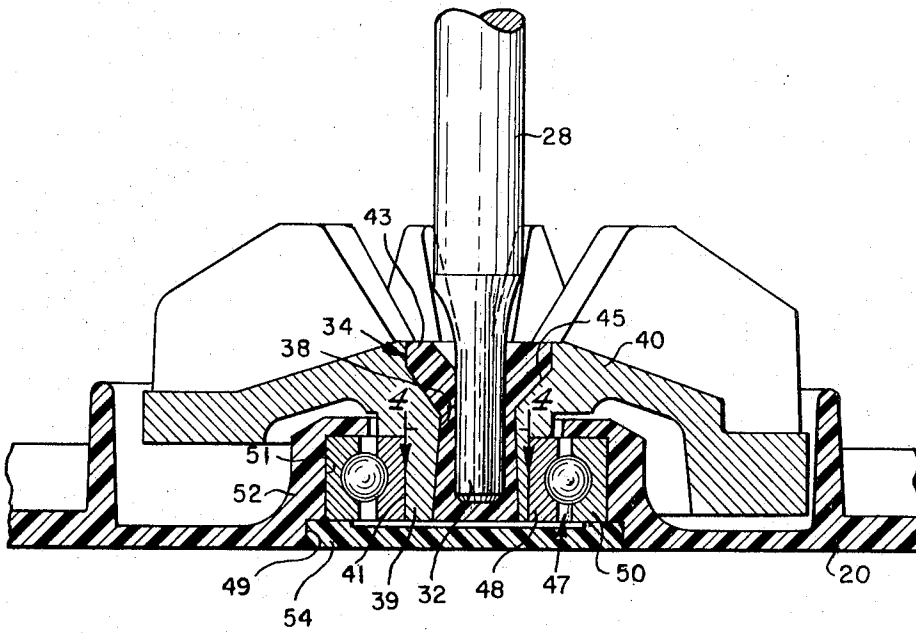
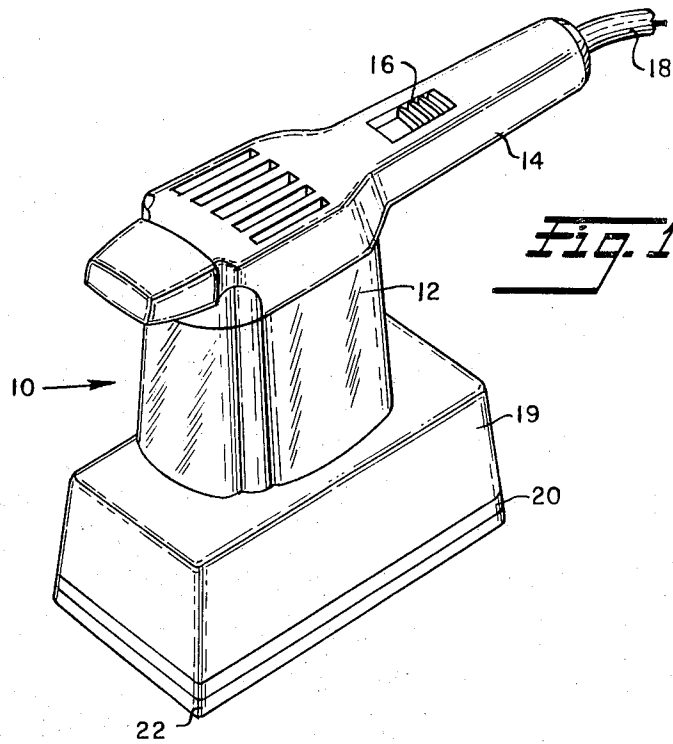
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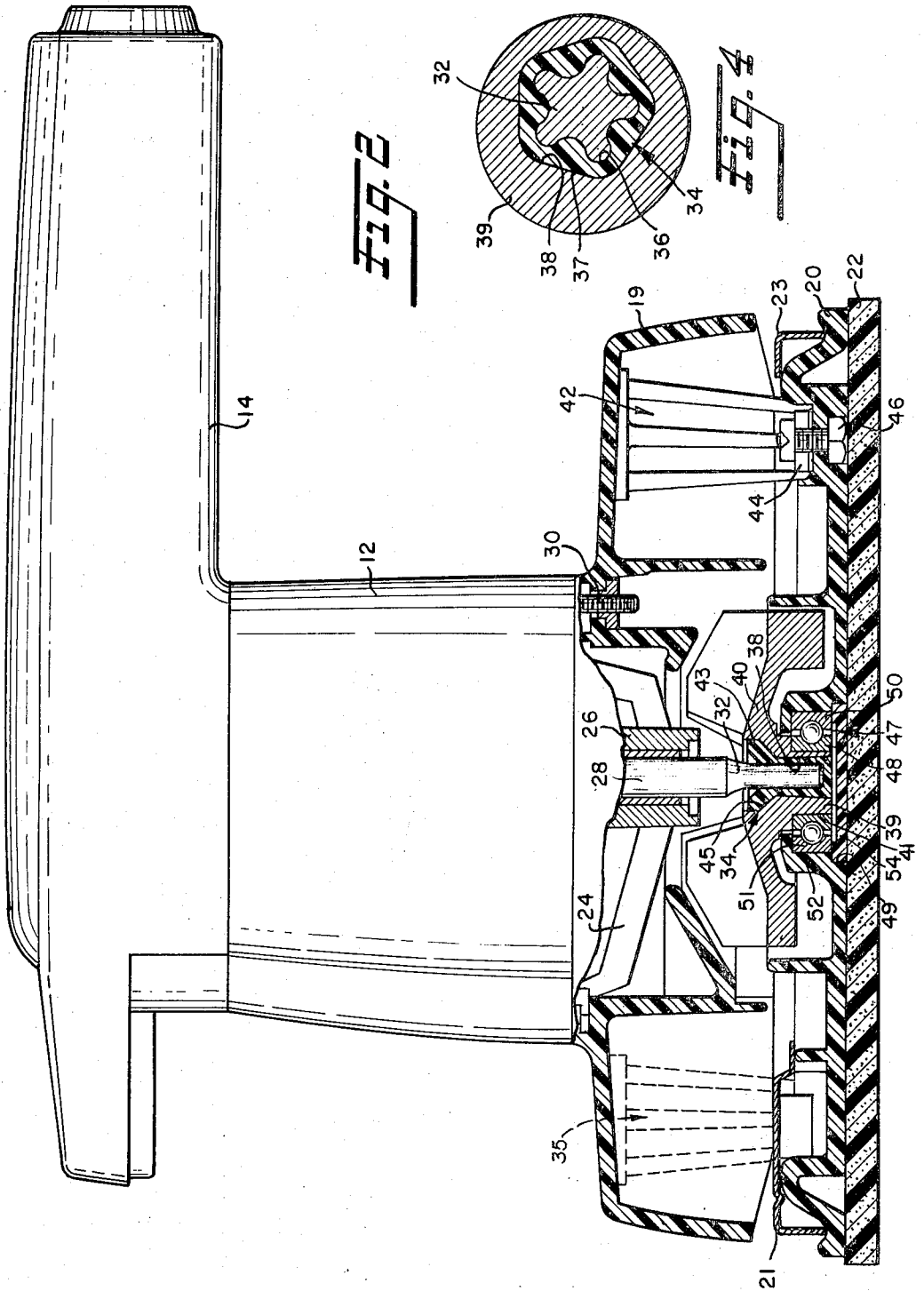
[57] **ABSTRACT**

A portable sander tool of the orbital type wherein the housing is formed of insulating material, the lower end of the motor shaft being connected to a wear inhibiting sleeve drivably connected with the conventional counterbalance, together with a base plate of insulating material which is provided with a central opening for receiving a bearing having its outer race pressed into a bore in the base plate and having its inner race pressed on to a hub of the counterbalance, the central opening in the plate being sealed by a cap of insulating material thus sealing the lubricant in the bearing opening and preventing access to the bearing and shaft from the bottom of the tool to achieve double insulation, the wear inhibiting sleeve, counterbalance, base plate and bearing being permanently assembled and constituting a self-contained unit or sub-assembly adapted to be removably bolted to the housing for replacement by a new unit in the event this becomes necessary in servicing the tool.

4 Claims, 4 Drawing Figures







DOUBLE INSULATED PORTABLE SANDER

DESCRIPTION OF THE INVENTION

It is accordingly the principle object of the present invention to provide a novel portable sanding tool which is constituted in such a manner as to effectively and permanently seal the bearing against contamination and loss of lubricant and to also prevent access thereto from the bottom of the tool thereby providing a sander wherein maximum bearing life is assured with the added safety of double insulation.

Another object of the invention is to provide in a tool of the above type a novel arrangement wherein the oscillating base plate is formed of insulating material and the bearing interconnecting the drive shaft and plate is assembled through an opening in the plate which, after assembly, is sealed with a cap of insulating material to provide the seal and insulating features referred to above.

A further object includes the use of a novel sleeve of wear inhibiting material for drivably connecting the motor shaft with the counterbalance, such an arrangement providing a wear-inhibiting and highly efficient driving connection between the shaft and the oscillating base plate.

Still another object is to provide a novel self-contained, replaceable oscillatable unit comprising the coupling sleeve of insulating material, the counterbalance, the insulated base plate and the bearing interposed between the counter-balance and the base plate, such unit being permanently assembled and readily adapted to be interconnected with the drive shaft and removably bolted to the tool housing.

A still further object is to provide a portable tool of the above character which may be manufactured at a relatively low cost but which is highly reliable in operation.

The above and other objects of the invention will appear more fully hereinafter from a consideration of the following detailed description when taken in connection with the accompanying drawings illustrative of a preferred form of the invention. It will be expressly understood however, that the drawings are utilized for purposes of illustration only and are not to be taken as a definition of the limits of the invention, reference for this latter purpose being had to the appended claims.

In the drawings, wherein similar reference characters refer to similar parts throughout the several views:

FIG. 1 is a perspective view of a portable electrical sanding tool embodying the principles of the present invention;

FIG. 2 is a side view of the tool of FIG. 1, the lower portion thereof being shown in section,

FIG. 3 is an enlarged sectional view of a portion of the lower part of the tool, and

FIG. 4 is an enlarged sectional view of the drivable connection between the motor shaft and the counterbalance taken substantially along line 4—4 of FIG. 3.

The novel portable sanding tool 10 of the present invention is illustrated in FIG. 1 as comprising a motor housing 12, an upper handle member 14 including conventional switch 16 and line cord 18, a lower housing member 19 and a lower oscillating base plate 20, the parts 12, 14, 19 and 20 all being constructed of a suitable insulating material in order to provide a double in-

sulated tool as will appear more fully hereinafter. It will be understood that the tool 10 is also provided with a platen 22 of resilient material suitably adhered to the plate 20 and an abrasive sheet is secured to the base plate 20 and platen 22 as by releasable clamps 21, 23, the construction being such that in the operation of the tool, the base plate 20, platen 22 and the sheet will partake of an orbital motion for use in the sanding of a workpiece.

In the form of the invention illustrated in FIG. 2, the electric driving motor is supported by a spider 24 having a central bearing part 26 through which a motor shaft 28 extends, the spider being suitably supported between the motor housing 12 and the lower housing member 19, a plurality of bolts, one of which is shown at 30 being provided for interconnecting the parts 14, 12, 24 and 19 in assembled condition. The shaft 28 has a lower end 32 extending past the spider 24 and is drivingly connected to a hub 39 of a counterbalance 40. The hub 39 has an eccentric peripheral surface 41 on which a bearing 50 is disposed, the latter being seated in an opening 51 in the base plate 20. Thus, when the motor is energized, the rotating shaft 28 rotates the counterbalance 40 which, through its eccentric hub 39 and bearing 50, orbits the base plate 20 and platen 22.

Since the counterbalance 40 rotates with the motor shaft 28 and orbits with the base plate 20 and platen 22, it is necessary that some relative motion be accommodated between this shaft 28 and counterbalance 40. The shaft 28 is constructed of steel, and the counterbalance 40 of aluminum, cast iron, sintered iron, zinc, brass, etc., and to prevent wear between these relatively movable parts, a sleeve 34 is provided therebetween. This sleeve 34, which may be constructed of a suitable wear inhibiting material, such as urethane, and has a splined or fluted bore 36 slidably receiving the correspondingly fluted shaft end 32. As will be seen in FIG. 4, the exterior of the sleeve 34 has a polygonal formation 37, and fits within a correspondingly shaped, e. g., tapered bore 38 formed in the hub 39 of the counterbalance 40. The sleeve 34 has a flared upper end 43 seated in a flared outer end 45 of bore 38. Thus, the counterbalance 40 will be rotated by the rotation of the motor shaft 28, while the sleeve 34, through its fit with shaft end 32 and counterbalance 40, accommodates limited relative movement therebetween. In order to support the base plate 20 for orbital movement, a plurality of sets of flexible or resilient fingers 35, 42, see FIG. 2, are secured to the housing member 19, the fingers having an apertured base part 44 for receiving a plurality of bolts, one of which is shown at 46.

As described above, the means for drivably connecting the counterbalance 40 with the base plate 20, shown in FIGS. 2 and 3, includes a conventional bearing having inner and outer races 48 and 50. The base plate 20 has a hub 52 provided with a bore 51 into which the outer race 50 of the bearing 47 is press fitted. The inner bearing race 48 is pressed over the eccentric surface 41 of counterbalance hub 39. A counterbore 49 on base plate 20 receives a cap 54 constructed of insulating material which is sealed in place therein in suitable fashion, such as ultrasonic welding. It will be understood that the bearing 47 is suitably lubricated by material disposed in the cavity defined by bore 51 and counterbore 49, and that the permanently sealed cap 54 not only prevents loss or contamination of lubricant,

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(thereby extending the life of bearing 47), but also prevents access to the bearing 47 and other live conductive parts.

An important feature is that the sleeve 34, counterbalance 40, bearing 47, and the insulated base plate 20 are permanently assembled, and constitute a self-contained unit or sub-assembly which is removably secured 46 to the housing member 19 through the bolts 46 and flexible fingers 41 and 42. Such unit may be readily replaced at any time should this be necessary in servicing the tool. This is advantageous in that it makes replacement of worn parts, usually the bearing 47, virtually foolproof even for the most inexperienced user.

From the foregoing it will be readily appreciated that the present invention provides a novel portable electric sanding tool wherein the housing structure including the base plate 20 is formed of insulating material and the bearing 47 and other conductive parts are inaccessible, in order to achieve double insulation. The use of the wear inhibiting sleeve 34 for interconnecting the shaft end 32 and the counterbalance 40 provides a durable wear member capable of long life, while the permanently assembled bearing, counterbalance, and base plate together with the sealing cap, provides an extremely easy and safe method of replacing these parts while permanently sealing the bearing for long life. Such an arrangement also insures that no metal parts are accessible to the operator, thus assuring a portable electric tool having double insulation and therefore dispensing with the necessity of utilizing the conventional ground wire.

While the invention has been shown and described herein with considerable particularity, it will be understood that the scope thereof is to be determined by the appended claims.

What is claimed is:

1. In a portable electric sanding tool of the type having a housing formed of insulating material, a rotatable shaft journaled therein and having a free end adapted to be connected to a base plate for oscillating the latter, the base plate being resiliently mounted to the housing, the invention which comprises means for drivably connecting said free end and base plate including a coun-

terbalance secured to said free end for rotation therewith, a hub formed on said counterbalance, a hub formed on said base plate, a bearing structure interconnecting said hubs, said structure having an outer race pressed in an opening in the second-named hub and having an inner race pressed on the first named hub, said base plate being formed of insulating material, said opening in said second-named hub extending through said base plate for facilitating assembly of the bearing races on both of said hubs, and defining a lubricant cavity, and a cap of insulating material closing said opening and sealed to said base plate.

2. In a portable electric sanding tool of the type having a housing formed of insulating material, a rotatable shaft journaled therein and having a free end adapted to be connected to a base plate for oscillating the latter, resilient means interconnecting the base plate to the housing, the invention which comprises means for drivably connecting said free end of said shaft and said base plate including a wear inhibiting coupling sleeve provided with a non-circular bore slidably and non-rotatably receiving said shaft free end, said sleeve having a non-circular outer surface, a counterbalance non-rotatably connected to said outer surface for conjoint rotation with said shaft free end and said sleeve, a hub formed on said counterbalance, a hub formed on said base plate, and a bearing interconnecting said hubs, said bearing having an outer race pressed in the second-named hub and an inner race pressed on the first named hub.

3. A self-contained sub-assembly unit for a portable electric sanding tool of the type having an insulating housing and a rotatable shaft journaled therein, said unit comprising a base plate of insulating material, a counterbalance, a bearing structure interposed between the base plate and counterbalance, and a wear inhibiting coupling sleeve drivably connected with the counterbalance and provided with a fluted bore, said unit being adapted to be resiliently and removably supported by said housing with said shaft receivable in said bore.

4. A portable tool as set forth in claim 2 wherein said sleeve bore and said shaft free end are fluted.

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