(54) RIGHT-ANGLE PLUNGE ROUTER

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(57) ABSTRACT

A portable electric right-angle plunge router (10) is disclosed which has a pair of laterally spaced apart bases (13, 14), two pair of laterally spaced apart columns (12) and a motor housing assembly (11). The bases (13, 14) have planar work engaging surfaces (15). Affixed to the bases (13, 14) are the laterally spaced apart columns (12) which extend perpendicularly to the work engaging surfaces (15). The motor housing assembly (11) has a central axis which is parallel to the work surface and is mounted on the laterally spaced apart columns (12) to allow the housing assembly to move vertically toward and away from the bases. Laterally spaced apart column guides (17) affixed to the housing (11) are aligned and sized to slidingly engage the columns (12). A handle is formed in the housing (11) between the front and rear column guides (17). A drive motor affixed in the housing has an armature shaft which is rotatable about an axis being substantially the horizontal axis of the housing (11). An arbor (25) is affixed in the housing and oriented substantially perpendicular to the horizontal axis of the housing (11). A tool chuck (24) affixed to the arbor (25) receives a cutting tool (20). The arbor (25) and armature shaft are interconnected by meshed gears thereby providing for right-angular transmission of power to the cutting tool (20). A depth-of-cut gauge (35) and lock-down mechanism (37, 39) are provided.
RIGHT-ANGLE PLUNGER ROUTER

BACKGROUND OF THE INVENTION

[0001] The present invention relates to hand-held plunge routers. More particularly, the invention relates to a hand-held, portable electric, right-angle plunge router capable of cutting work surfaces that are not accessible with conventional routers, prior plunge routers, or other cutting tools. One example is flooring material at or near the point where the flooring material abuts walls and cabinets. Another example is flooring material along the tock of cabinets. Yet another example is work surfaces in corners. The present invention is the same invention that was briefly described in my provisional patent application No. 60/213,939 titled Plunge Router.

[0002] Routing tools are well known in the art. Conventional routers are generally constructed with the motor housing and motor oriented along a vertical axis. A flat circular base plate is attached to the motor housing with its axis oriented perpendicular to the axis of the housing and motor. The motor drives a shaft which is oriented along the axis of the motor. A cutter secured to a tool chuck, which is secured to the motor shaft, extends through an opening in the center of the base plate. Some router designs allow the base plate to be pivoted to provide for angular cuts. In a prior design disclosed in U.S. Pat. No. 3,494,395 a router is designed with a vertically oriented arbor and a motor shaft oriented at some supplementary angle with respect to the vertical axis of the arbor. The arbor and motor shaft are interconnected by a pair of beveled gears fixed to the arbor and shaft respectively.

[0003] Plunge routers are also well known in the art. Plunge routers are generally constructed with the motor housing and motor oriented along a vertical axis and perpendicular to the axis of the base plate. A pair of laterally spaced, parallel columns fixed perpendicular to the base plate extend into column guides in the housing. A downward force on the housing moves the housing downward along the columns thereby moving the arbor and cutter downward through an opening in the center of the base plate and into the work surface. Examples of plunge routers are disclosed in U.S. Pat. Nos. 4,938,264; 5,207,253 and 5,310,916.

[0004] Right-angle hand held cutting tools and the means thereof for transmitting rotary motion between angularly displaced shafts are also generally known in the art. Examples are disclosed in U.S. Pat. Nos. 3,411,024; 4,347,450 and 4,810,916.

[0005] However, prior tools are unsuitable or incapable of cutting work surfaces in close proximity to other surfaces which abut and are perpendicular to the work surface, work surfaces in confined areas, or work surfaces in corners.

[0006] Therefore, it is an object of the present invention to provide a hand-held, portable electric, right-angle plunge router capable of cutting work surfaces in close proximity to other surfaces which abut and are perpendicular to the work surface, work surfaces in confined areas, and work surfaces in corners.

SUMMARY OF THE INVENTION

[0007] A portable electric, right-angle plunge router is disclosed which has a front and rear base, a plurality of laterally spaced columns, and a motor housing assembly. The front and rear bases are laterally displaced and each have a planar work engaging surface. Another embodiment could consist of a single large base plate with a planar work engaging surface; however, the preferred embodiment of the present disclosure consists of a pair of base plates. Affixed to each base are a pair of laterally spaced columns which extend perpendicular to the work engaging surface. The columns are covered with bellows to prevent dirt from the columns.

[0008] The motor housing assembly is oriented with its central axis parallel to the work engaging surface. The motor housing assembly is translatable movable upon the columns relative to the bases to move a cutting tool into and out of engagement with the work surface. The motor housing assembly includes a housing and a drive motor for rotating the cutting tool, and four column guides. The drive motor, affixed to the housing, has an armature shaft rotatable about an axis which extends horizontal to the planar work engaging surface. Four column guides are affixed to the housing and are aligned and sized to slidingly engage the columns. A primary handle is formed in the housing between the front and rear column guides. A threaded sleeve is embedded in each side of the housing to allow a threaded auxiliary handle to be attached to either side of the housing. The plunge router also includes a depth-of-cut gauge, and a lock down mechanism to lock the router at the desired cutting depth.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a perspective view of a plunge router in accordance with the present invention.

[0010] FIG. 2 is a cross-sectional view of the left side elevation of the plunge router.

[0011] FIG. 3 is a plan view of the plunge router.

[0012] FIG. 4 is a front elevation view of the plunge router.

[0013] FIG. 5 is a rear elevation view of the plunge router.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] A portable electric, right-angle plunge router 10 shown in FIG. 1 includes a front base plate 13 and a rear base plate 14 which have planar work engaging surfaces 15. Another embodiment would comprise one large base plate with a planar work engaging surface. However, the preferred embodiment of this description consists of a pair of base plates. A plurality of laterally spaced columns 12 are affixed to the front base plate 13 and rear base plate 14 and extend perpendicular away from the work engaging surface 15 of the base plates. The router housing 11 is mounted on said columns 12 for movement along a central vertical axis toward and away from the bases.

[0015] Referring to FIG. 2, the columns 12 are covered by bellows 16 and extend through front and rear column guides 17 which are part of the housing 11. A handle is formed by an opening in the housing 11 between the front and rear column guides 17. A trigger power switch 18 in the handle controls a motor 19 arranged in the housing. The motor 19 is arranged in the housing 11 in a manner to provide right-angular transmission of power to a cutting tool 20.
optimal cutting of the work surface, the diameter of the cutting tool 20 is such that the outer edge of the cutting tool is substantially vertically aligned with the front face 21 of the housing 11. A power lock-on switch 22 is provided to lock the power on while the router is in use. An auxiliary handle 23 is provided to facilitate convenient usage and control of the plunge router 10. The auxiliary handle 23 is threaded and can be attached to either side of the housing 11 by means of internally threaded sleeves embedded in each side of the housing.

[0016] A cutting tool 20 is attached to a tool chuck 24 which is affixed to an arbor 25. The arbor 25 is journaled by spaced antifriction bearings 26, 27, and 28 in the housing 11. The arbor 25 is driven by an electric motor with an affixed armature shaft 29. The armature shaft 29 is journaled by spaced antifriction bearings 30, 31 and 32 in the housing. The arbor 25 and armature shaft 29 respectively, thereby providing for right-angular transmission of power directly from the armature shaft 29 to the arbor 25, thence to the cutting tool 20.

[0017] When a downward force is applied, the housing 11 travels downward along the columns 12 and the cutting tool 20 is plunged into the work surface. As the housing 11 travels downward, the columns 12 project into the column guides 17 which are part of the router housing 11. The depth of cut is controlled by an adjustable depth-of-cut gauge 35 affixed to the rear of the housing 11. The depth-of-cut gauge 35 consists of a guide on the housing 11 and a bar arranged displaceably in the vertical direction in the guide. A vertical slot is provided in the center of the depth-of-cut gauge bar. A threaded shaft on the clamping knob 36 passes through the slot in the depth-of-cut gauge bar and is threaded into an internally threaded grommet embedded in the housing 11. Calibrations are provided on the rear of the housing 11 and an indicating mark is provided on the depth-of-cut gauge bar. The desired depth of the cutting tool 20 is set by raising or lowering the depth-of-cut gauge bar until the indicating mark is aligned with the desired depth calibration. The depth-of-cut is then locked in position by tightening the clamping knob 36. The downward movement of the housing 11 and cutting tool 20 are stopped when the depth-of-cut gauge 35 contacts the rear base plate 14.

[0018] When the desired cutting depth is reached, the housing 11 can be locked-down with a lock-down mechanism. The lock-down mechanism consists of a threaded rod 37, and an internally threaded shaft 38 affixed to a knob 39. The lock-down mechanism rod 37 is affixed to the front base plate 13 so that the rod is stationary and extends perpendicular to and away from the work engaging surface 15. The lock-down mechanism rod 37 and shaft 38 extend through the center of the housing 11. When the desired cutting depth is reached, the lock-down mechanism shaft 38 is turned down onto the lock-down mechanism rod 37 by turning the knob 39 until the housing 11 is locked into position at the desired cutting depth. The plunge router 10 is moved laterally along the work surface to effect cutting of the work surface.

[0019] As shown in FIG. 3 and FIG. 4, the sides of the housing 11 are tapered inward at the front of the housing to form a narrow front face 21 to facilitate cutting of work surfaces in corners.

[0020] As shown in FIG. 5, an adjustable depth-of-cut gauge 35 is affixed to the rear of the housing 11. The depth-of-cut gauge 35 consists of a guide on the housing 11 and a bar arranged displaceably in the vertical direction in the guide. The depth-of-cut gauge 35 is locked in position by a clamping knob 36. Calibrations are provided on the housing and an indicating mark is provided on the depth-of-cut gauge bar. The desired depth of the cutting tool 20 is set by raising or lowering the depth-of-cut gauge bar until the indicating mark is aligned with the desired depth calibration. The depth-of-cut is then locked in position by tightening the clamping knob 36.

[0021] The above description of the claimed invention is intended to enable one of ordinary skill in the art to practice the invention. While one embodiment has been disclosed, other modifications are possible and may be made without departing from the spirit of the present invention. The preceding description should be read in an illustrative sense. The scope of the invention should be interpreted by reference to the following claims.

I claim:

1. A portable, right-angle plunge router for cutting a work surface comprising:
   (a) a pair of laterally spaced apart bases, said bases having planar work engaging surfaces;
   (b) a pair of laterally spaced apart columns affixed to each base and extending perpendicularly away from the work engaging surfaces of the bases;
   (c) a housing mounted on said columns for movement along a central vertical axis toward and away from the bases;
   (d) a plurality of laterally space apart column guides affixed to said housing, aligned and sized to slidingly engage said columns;
   (e) a motor affixed in said housing having an armature shaft journaled in spaced apart bearings in the housing, and rotatable about an axis being substantially the horizontal axis of the housing;
   (f) a driving gear on the forward end of said armature shaft;
   (g) an arbor, journaled in spaced apart bearings in the housing, oriented substantially perpendicular to the horizontal axis of the housing;
   (h) a gear at the upper end of said arbor and engaging the drive gear on the armature shaft;
   (i) a tool chuck affixed to the lower end of the arbor;
   (j) a removable handle, attachable to either side of the housing;
   (k) a depth-of-cut gauge whereby the cutting tool depth can be accurately set; and
   (l) a lock-down mechanism whereby the router can be locked down at the desired cutting depth.

2. The portable right-angle plunge router of claim 1 wherein said housing has a central axis which is parallel to the work surface.

3. The portable right-angle plunge router of claim 1 wherein said bases are displaceable in a direction extending parallel to the horizontal axis of the housing.
4. The portable right-angle plunge router of claim 1 wherein said arbor has an axis which is substantially perpendicular to the central axis of the housing.

5. The portable right-angle plunge router of claim 1 wherein said lock-down mechanism comprises:

- a threaded rod affixed in a stationary manner to the front base plate and extends perpendicularly away from the work engaging surface of the front base plate; and

further comprising an adjusting element.

6. The portable right-angle plunge router of claim 5 wherein said adjusting element is comprised of an internally threaded shaft affixed to a rotary knob.

7. A portable, right-angle plunge router comprising:

(a) a pair of laterally spaced apart bases, said bases having planar work engaging surfaces;

(b) a pair of laterally spaced apart columns affixed to each base and extending perpendicularly away from the work engaging surfaces of the bases;

(c) a motor housing assembly mounted on said columns for movement along a central vertical axis toward and away from the bases;

said motor housing assembly including:

- a plurality of laterally space apart column guides affixed to said housing, aligned and sized to sidingly engage said columns;

- a drive motor affixed in said housing having:

  - an armature shaft journaled in spaced apart bearings in the housing,

  said armature shaft rotatable about an axis being substantially the horizontal axis of the housing;

- a primary handle formed in the housing;

- a plurality of switches disposed on said primary handle;

- a removable threaded handle attachable to either side of the housing;

- a depth-of-cut gauge whereby the cutting tool depth can be accurately set.

8. The portable right-angle plunge router of claim 7 wherein the sides of the said housing are tapered inward at the front of the housing to form a narrow front face.

9. The portable right-angle plunge router of claim 7 wherein said primary handle is formed in the housing between the front and rear column guides.

10. The portable right-angle plunge router of claim 7 wherein said switches disposed on the primary handle comprise:

- a trigger power switch, and

- a power lock-on switch.

11. The portable right-angle plunge router of claim 7 wherein an internally threaded sleeve is provided on the left and right sides of the housing to accept said removable threaded handle.

12. The portable right-angle plunge router of claim 7 wherein said depth-of-cut gauge comprises:

- a guide on the housing,

- a bar arranged displaceably in the vertical direction in said guide and having an indication mark, and

- a clamping knob.

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