March 16, 1954 J. H. GODFREY ET AL 2,672,172

ELECTRIC PLANE

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FIG. 1

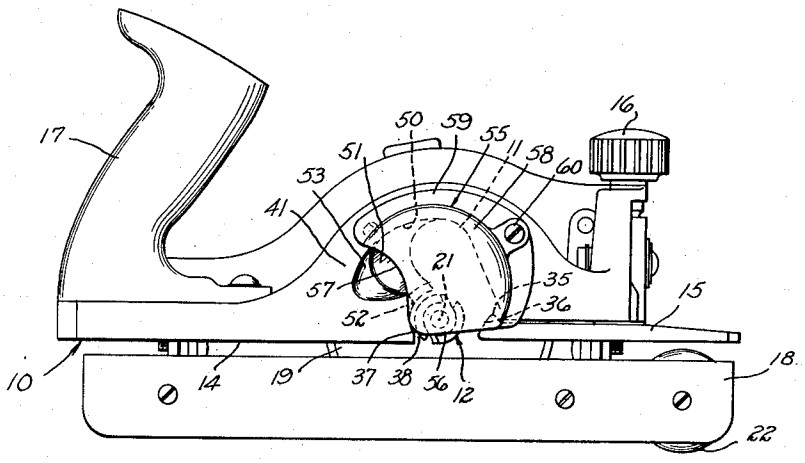


FIG. 2

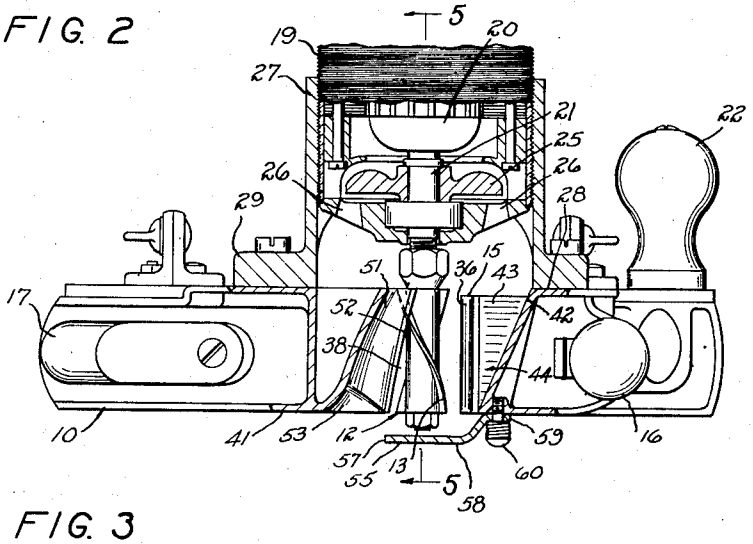
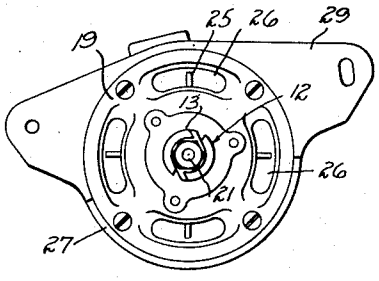


FIG. 3



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FIG. 4

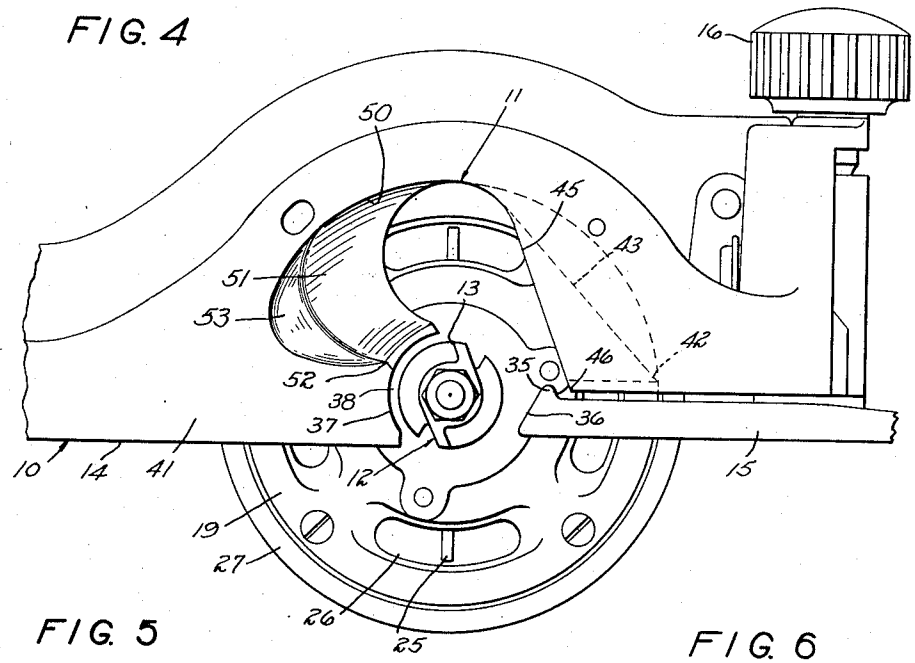


FIG. 5

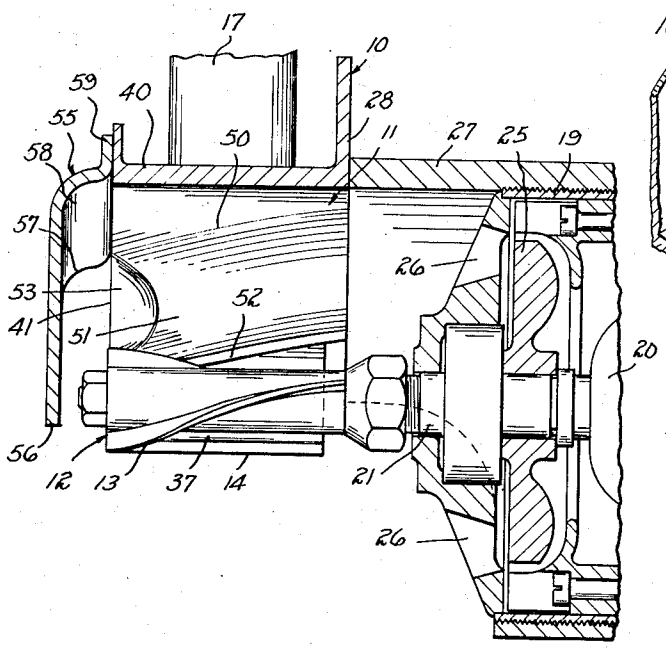


FIG. 6

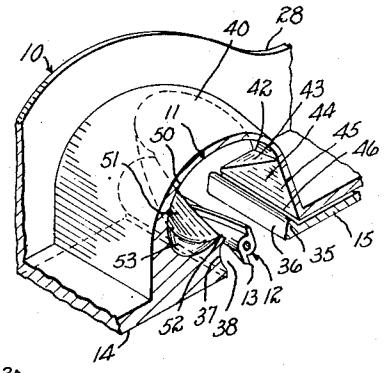
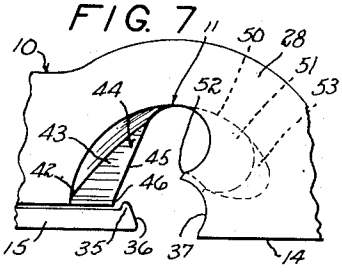


FIG. 7



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Patented Mar. 16, 1954

2,672,172

UNITED STATES PATENT OFFICE

2,672,172

ELECTRIC PLANE

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Application December 4, 1951, Serial No. 259,748

3 Claims. (Cl. 144—117)

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This invention relates to a power-driven plane of the type having a plane body across the bottom surface of which extends a rotary tool provided with helical cutting edges.

The object of the invention is to provide in a plane of this sort an improved and effective arrangement for producing an air flow through the plane body and with respect to the cutter of such character and nature that the possibility of chips or particles becoming lodged under the plane body and marring the finished surface is eliminated, while at the same time the air flow is such as to produce a positive disposal or discharge of the chips rearwardly and downwardly away from the cutter and away from the operator.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangements of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the drawings:

Fig. 1 is a side elevational view of a plane constructed in accordance with the present invention, the front end of the plane being to the right in the figure;

Fig. 2 is a fragmentary top plan view of the plane with parts shown in cross section to illustrate the details of construction;

Fig. 3 is an end view of the motor and cutter assemblage utilized in the construction;

Fig. 4 is an enlarged fragmentary view similar to Fig. 1 with parts removed to illustrate details of construction;

Fig. 5 is a fragmentary cross-sectional view taken as shown by the line 5—5 of Fig. 2;

Fig. 6 is a fragmentary perspective view of the plane body and showing the cutter disposed therein; and

Fig. 7 is a fragmentary elevational view of the inner face of the plane body.

In the present illustrative disclosure of the invention, the plane comprises generally a plane body 10, here in the form of a casing, having a transverse passage 11 through which a flow of air is adapted to take place, the passage being slotted or open at its bottom so as to accommodate the usual rotary tool 12 which has left-hand helical cutting edges 13. Rearwardly of the opening, the plane body has a flat surface 14 adapted to rest upon the surface of the work behind the cutter. Forwardly of the cutter, the plane is provided with the usual vertically adjustable shoe 15 which is adapted to rest upon the work forwardly of the cutter during a planing operation. This shoe may be adjusted by turning the knob 16 to obtain the desired depth of cut upon each pass of the plane over the surface to be finished. The body is provided at its rear end with an upstanding operating handle 17. The plane body may be provided with the usual fence or guide 18, the angle of which with respect to the surface of the plane may be adjusted, as well understood in the art and an additional handle or knob 22 may be provided on the fence.

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The plane further has a motor unit which comprises a housing 19 within which is supported a motor 20 having a shaft 21 on the projecting end of which is suitably secured the cutter 12. The motor has an air ventilating system which comprises a fan 25 fixed to the shaft, the fan being so constructed that, when the motor is in operation, air is drawn through the motor to ventilate it and also to blow the chips, dust and the like through the passage 11 in the plane body. It will be noted that the end wall of the motor housing has openings 26 through which the air is discharged and the fan arrangement is such as to provide said discharge in a generally spiral pattern. The motor casing is threaded into a sleeve 27 whereby the position of the cutter may be properly adjusted axially of itself and crosswise of the plane body. The sleeve is secured to the inner face 28 of the plane in general registry with the passage 11 by means of screws passing through the flange 29 on the sleeve.

In accordance with the present invention, the air passage 11 through the plane body 10 is so constructed and arranged that the chips and particles removed from the work are carried by the air stream along a spiral flow path defined by the passage so that the chips and particles cannot be lodged between the surface 14 of the plane and the surface of the work being operated upon. Furthermore, the air passage is arranged to discharge the air and the chips and particles downwardly and outwardly from the plane body and rearwardly of the cutter so that the cutting blades cannot imbed the chips or particles in the workpiece, thereby marring the same.

In the present illustrative disclosure, on the top surface and at the rear end of the shoe 15 is a transversely extending lip or rib 35 and the rear end of the shoe has an upwardly and forwardly inclined surface 36, part of which is formed by the rear end of the lip. Opposing this

surface and in spaced relation thereto is a forwardly facing semi-cylindrical groove or channel 37 in the plane body struck generally about the axis of the shaft. The space between the groove and the surface 36 comprises a slot 38 across the bottom of the plane body which accommodates the cutter and which is in communication with the passage 11.

Referring now to the passage 11, the central portion of its top wall 40 is curved longitudinally of the plane and extends generally parallel to the axis of the cutter. The passage forwardly of a vertical medial plane through the axis of the cutter and said central portion of the top wall is curved downwardly and forwardly and is inclined generally upwardly and rearwardly from the inner face 28 of the plane body to the outer face 41 of the plane body. This portion of the passage decreases in longitudinal cross-sectional area from the plane's inner face 28 to the plane's outer face 41. The surface defining said portion of the passage at its lower edge 42 terminates at the forward edge of a ledge 43 (Fig. 6) formed by a rearward extension 44 on the plane body. This ledge is in the form of a right triangle and is inclined upwardly from the inner face of the plane body to the outer face. The rear surface 45 of this extension, which is also in the form of a right triangle in reverse relation to the ledge, is inclined upwardly and rearwardly from a line 46 forwardly of the lip of the shoe and generally parallel to the axis of the cutter.

Now, referring to the rear section of the passage 11, the same curves rearwardly and downwardly as at 50 from the vertical medial plane through the axis of the cutter and then forwardly to define a groove at 51 which meets or substantially meets the generally helical upper edge 52 of the groove 37 which overlies a rear portion of the cutter to prevent chips from following the cutter rearwardly thereof. The aforementioned rear section of the passage is inclined downwardly and rearwardly from the inner face 28 of the plane to the outer face 41 of the plane. Thus the rear half of the passage just described gradually increases in vertical cross-sectional area from the inner face 28 to the outer face 41. Considering the passage in its entirety then, it will be seen that the same is shaped to conform to the spiral flow path of air discharged from the motor-fan so as to avoid turbulence and to minimize resistance to flow. As will be seen from Fig. 4, the inlet end of the passage on the inner face of the plane overlies a plurality of the air discharge ports 26 in the motor casing so that a substantial flow of air will be directed into the passage. To further facilitate the proper flow and discharge of the air from the passage, the passage at its outer end is relieved or chamfered as indicated at 53 adjacent the outer face of the plane body.

Furthermore, in order to properly direct the flow downwardly and outwardly at the outer end of the passage, there is provided a cover or baffle 55 which is open at its lower edge 56 and at its rear lower corner 57 so as to provide a space for the chips to be discharged downwardly and rearwardly as they leave the passage. The rear edge of the cover stops short of the enlarged or chamfered outer end of the rear face of the rear section of the passage so that it accommodates the proper discharge of the chips from the groove 51. In the present illustrative disclosure, the body portion of the cover is dished out at 58 to obtain this spacing and it has a flange 59 extending across its top and downwardly at the front and this flange abuts against the outer surface of the plane body. In order to give ready access to the cutter, the cover is pivoted at 60 so that it may be thrown upwardly and forwardly out of the way.

During the operation of the plane as it is moved forwardly over the surface the spiral edges 13 on the cutter cut into the work and, since the cutter is rotated counterclockwise as viewed in Figs. 1 and 4, the chips are thrown upwardly and forwardly and axially outwardly of the cutter. Some of these chips will strike the inclined surface 36 of the shoe and be deflected against the deflecting surface 45, and other of the chips will be thrown directly onto the deflecting surface 45, and some of them may be thrown directly into the passageway; but in any event, these chips rebound upwardly and rearwardly onto the groove 51 which overlies a portion of the cutter to prevent the chips from returning to the work rearwardly of the cutter. At the same time, of course, the ventilating system of the motor is forcing a spiralling stream of air into and through the passage and part of this air is directed upwardly and outwardly by the inclined surface 43 of the ledge and the air will be directed rearwardly in part by that surface so as to throw the chips onto the groove 51. All of the air being directed from the inside of the plane to the outside of the plane, the chips will be carried downwardly and rearwardly for discharge rearwardly of the cutter as directed by the shape of the passage 11 and as directed by the cover or baffle 55. Thus the chips and other particles are positively discharged outwardly and downwardly of the plane body and generally rearwardly of the cutter whereby the same cannot interfere with the vision of the operator or with the operation of the plane.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. The forward end of the plane body is the leading end thereof as the plane is moved over the surface to be planed and the word "forwardly" as used in the specification and claims means in the direction of the forward end of the leading end of the plane. The terms "rear" and "rearwardly" are similarly related to the trailing end of the plane body when the plane is in use. The surface of the plane which slides over the work when the tool is in operation is customarily known as "the bottom" and, with that in mind, the terms "upwardly" and "downwardly" are used with reference to the plane of the bottom. The term "inner face" designates that side face or surface of the plane which faces the fan. The "outer face" is the other or opposite side face of the plane body.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

We claim as our invention:

1. In a plane of the type having a rotary cutter and a motor for driving the cutter and an electric fan, a plane body having a bottom surface, an inner face, an outer face, and an air passage arranged to receive air from the fan and defining

a generally spiral path for the flow of air and chips from the inner face to the outer face, said body having a slot in the bottom surface in communication with said passage and arranged to accommodate the cutter, the rear face of said slot being concentric to and extending substantially along and above the cutter rearwardly thereof, a deflecting surface inclined upwardly and rearwardly from the forward edge of said slot and gradually increasing in height from said inner face to said outer face, a ledge at the top of said deflecting surface and inclined upwardly and outwardly, said passage forwardly of a vertical plane passing through the axis of the cutter having a forwardly and downwardly curved surface terminating at said ledge and inclined upwardly and rearwardly from said inner face to said outer face of the body, said passage rearwardly of a vertical plane passing through the axis of the cutter having a curved surface extending downwardly and rearwardly and then forwardly to provide a forwardly facing groove, said groove being inclined downwardly and rearwardly from said inner face to said outer face.

2. In a plane of the type having a rotary cutter and a motor for driving the cutter and an electric fan, a plane body having a bottom surface, an inner face, an outer face, and an air passage arranged to receive air from the fan and defining a generally spiral path for the flow of air and chips from the inner face to the outer face, said body having a slot in the bottom surface in communication with said passage and arranged to accommodate the cutter, the rear face of said slot being concentric to and extending substantially along and above the cutter rearwardly thereof, a deflecting surface inclined upwardly and rearwardly from the forward edge of said slot and gradually increasing in height from said inner face to said outer face, a ledge at the top of said deflecting surface and inclined upwardly and outwardly, said passage forwardly of a vertical plane passing through the axis of the cutter having a forwardly and downwardly curved surface terminating at said ledge and inclined upwardly and rearwardly from said inner face to said outer face of the body, said passage rearwardly of a vertical plane passing through the axis of the cutter having a curved surface extending downwardly and rearwardly and then forwardly to provide a forwardly facing groove, said groove being inclined downwardly and rearwardly from said inner face to said outer face; and a work-engaging shoe disposed forwardly of said cutter below the forward portion of said bottom surface and having a rear surface inclined upwardly and forwardly towards said deflecting surface.

3. In a plane of the type having a rotary cutter and a motor for driving the cutter and an electric fan, a plane body having a bottom surface, an inner face, an outer face, and an air passage arranged to receive air from the fan and defining a generally spiral path for the flow of air and chips from the inner face to the outer face, said body having a slot in the bottom surface in communication with said passage and arranged to accommodate the cutter, the rear face of said slot being concentric to and extending substantially along and above the cutter rearwardly thereof, a deflecting surface inclined upwardly and rearwardly from the forward edge of said slot and gradually increasing in height from said inner face to said outer face, a ledge at the top of said deflecting surface and inclined upwardly and outwardly, said passage forwardly of a vertical plane passing through the axis of the cutter having a forwardly and downwardly curved surface terminating at said ledge and inclined upwardly and rearwardly from said inner face to said outer face of the body, said passage rearwardly of a vertical plane passing through the axis of the cutter having a curved surface extending downwardly and rearwardly and then forwardly to provide a forwardly facing groove, said groove being inclined downwardly and rearwardly from said inner face to said outer face and having a chamfer at its outer end; and a cover for said passage mounted on said outer face and terminating short of said chamfer.

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