Sept. 21, 1965 N. T. ANTON 3,207,195

ELECTRIC HAND PLANE

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Fig. 1

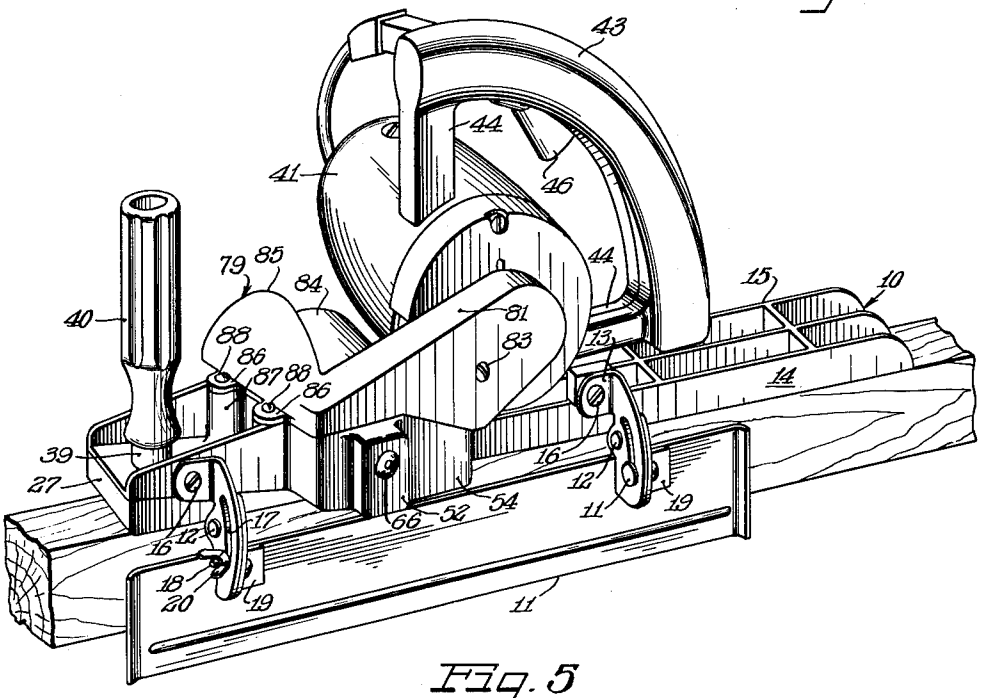
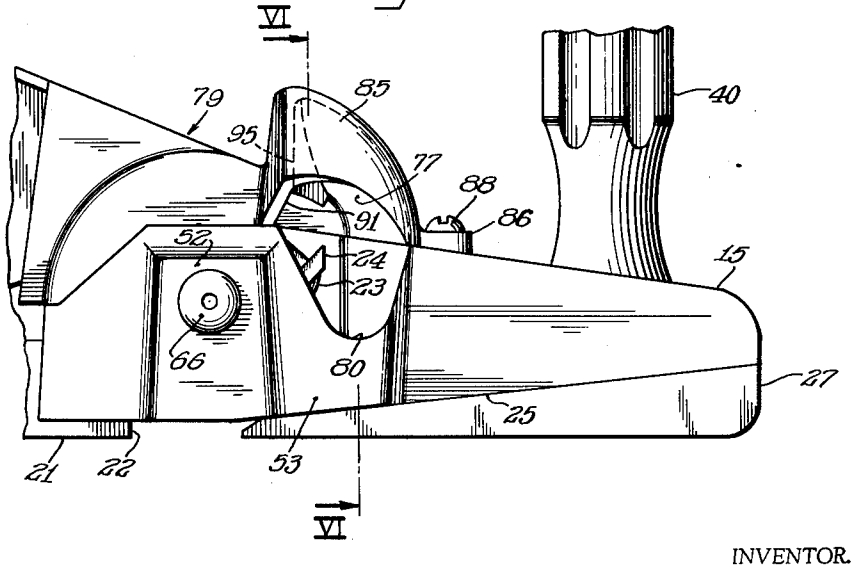


Fig. 5



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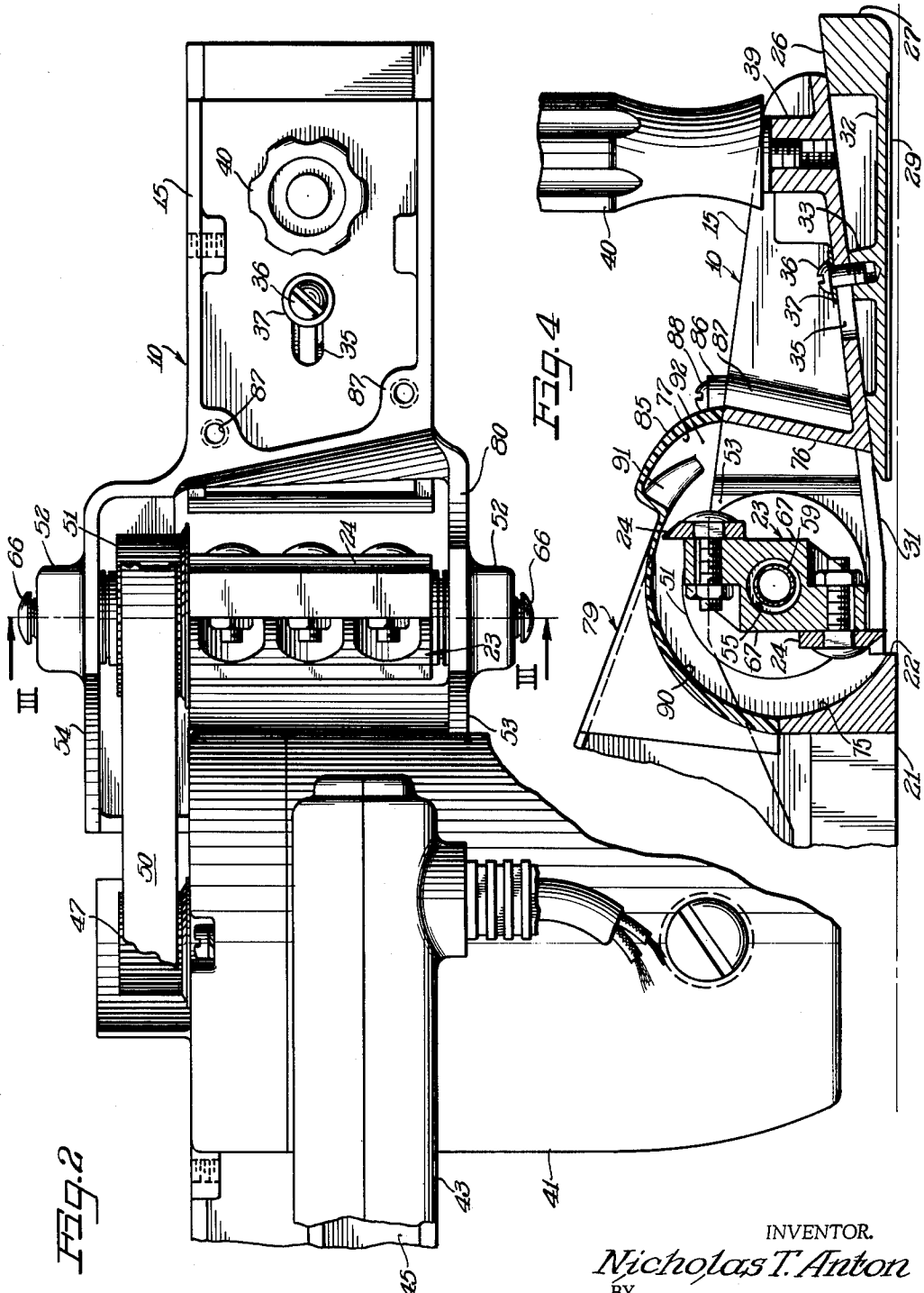


Fig. 2

Fig. 4

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Fig. 6

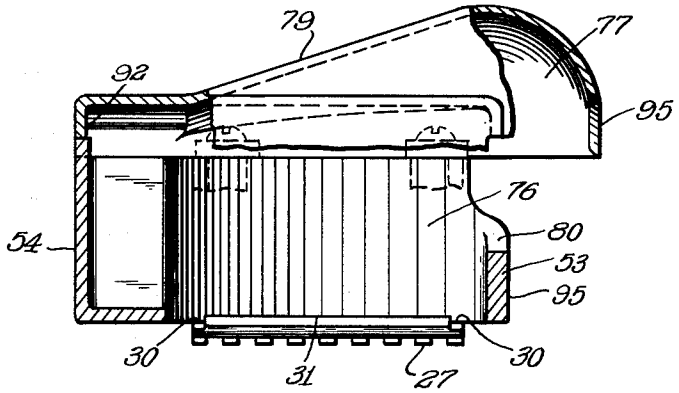


Fig. 3

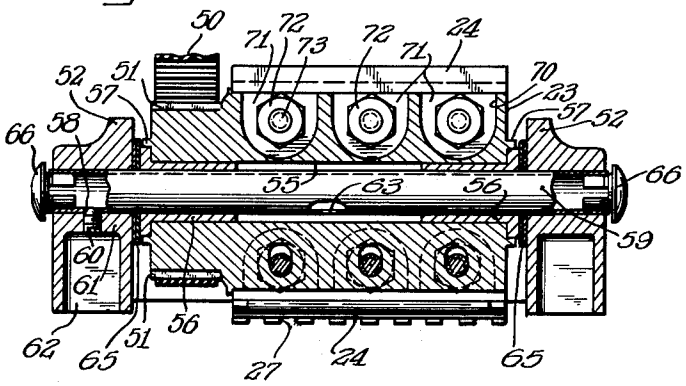


Fig. 7

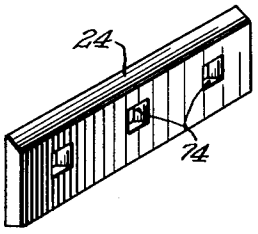
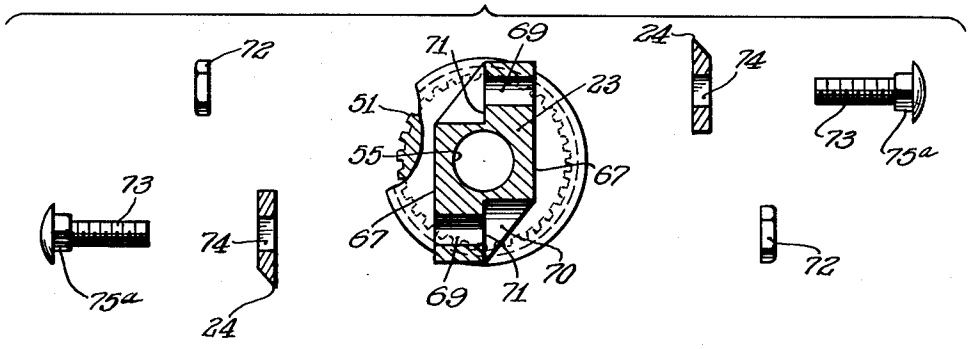


Fig. 8



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ELECTRIC HAND PLANE

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8 Claims. (Cl. 145—4)

This invention relates to improvements in planes and more particularly relates to an improved form of electric hand plane adapted for edge and surface planing.

A principal object of the present invention is to provide an improved form of electric hand plane arranged with a view toward utmost simplicity in construction and operation and economy in manufacture.

Another object of the invention is to provide an improved form of electric hand plane utilizing an adjustable wedge for varying the depth of the planing cut and having a simplified means for adjusting and holding the wedge in place.

A still further object of the invention is to improve upon the electric hand planes heretofore in use by spacing the motor from the cutter block and cutter blades and above the bottom surface of the plane, to provide clearance for surface planing and by so forming the cover for the cutter blades as to effect the discharge of chips to one side of and downwardly of the plane, by the impelling action of rotation of the cutter block and blades.

A still further object of the invention is to provide a simplified mounting for the cutter block of an electric hand plane, driven from a motor shaft spaced from the axis of rotation of the cutter block, in which an improved mounting for the cutter block is provided utilizing bronze bearings and distributing the loads between the ends and insides of the bearings at opposite end portions of the cutter block.

Still another object of the invention is to provide a simple and improved form of cutter block for an electric hand plane in which the cutter block is driven from a spaced motor shaft through a cogged belt and toothed pulleys, and in which one toothed pulley is formed integrally with the cutter block.

Still another object of the invention is to provide a simplified and improved mounting for the cutter block of an electric hand plane wherein the cutter block is mounted between the side walls of the base shoe of the plane on sleeve bearings on a stationary hollow shaft and wherein the hollow shaft is cross-drilled intermediate its ends to form a simplified form of means for lubricating the bronze bearings.

A still further object of the invention is to improve upon the mounting of the cutter blades on the cutter block of an electric hand plane in which the cutter blades extend chordally of an arc subscribed by the rotating blades, and in which bolts having heads with squared shanks registering with elongated slots in the blades forms a means for retaining the blades to the cutter block and accommodating adjustment to the blades with respect to the block.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

FIGURE 1 is a perspective view of an electric hand plane constructed in accordance with the principles of the present invention, showing the plane guided by a guide plate or fence, to trim the edge of a board;

FIGURE 2 is a fragmentary top plan view of the plane shown in FIGURE 1 with the cover for the cutter block and drive belt removed and with certain other parts broken away;

FIGURE 3 is a transverse sectional view taken substantially along line III—III of FIGURE 2 and illustrating the mounting for the cutter block;

FIGURE 4 is a fragmentary longitudinal sectional view taken substantially along the central portion of the plane and illustrating the chip ejector formed by the cover for the cutter block;

FIGURE 5 is a fragmentary view in side elevation of the forward end portion of the plane illustrating certain details of the chip ejector not shown in FIGURE 4;

FIGURE 6 is a transverse sectional view taken substantially along line VI—VI of FIGURE 5 and showing certain other details of the chip ejector not shown in FIGURES 4 and 5;

FIGURE 7 is a perspective view of one of the cutter blades; and

FIGURE 8 is an exploded view of the cutter block and blades.

In the embodiment of the invention illustrated in the drawings, I have shown in FIGURE 1 an electric hand plane **10** in position to plane the edge of a board and guided to plane in the proper plane by a guide plate or fence **11**, adjustable about pins **12, 12** extending longitudinally of the plane, to accommodate the plane to edge a board square with the surface of the board or at any desired bevel with respect to the board. The pivot pins **12, 12** are mounted on brackets **13, 13** detachably mounted on a side wall **14** of a base shoe **15** of the plane, by machine screws **16, 16**. Each bracket **13** extends outwardly and downwardly of the base shoe **15** in an arcuate path subscribed from an axis coaxial with the axis of the associated pivot pin **12** and has a slot **17** therein, formed about the axis of the pin **12** and having a screw **18** slidably extending therethrough. The screw **18** extends through a similar slot in a bracket **19** secured to the outer face of the fence **11** and has a wing nut **20** threaded thereon to hold the fence **11** in the proper position of adjustment.

The base shoe **15** may be made from cast aluminum and includes a plane horizontal bottom surface **21** extending for a greater portion of the length thereof, and terminating at its forward end in a gap **22** provided in the base shoe **15** for the blades of a rotary cutter block **23** having oppositely facing blades **24** carried thereby and rotatably driven to effect a planing operation.

The base shoe **15** also has a bottom inclined plane surface **25** (FIGURE 4) extending upwardly from the gap **22** to the forward end of the base shoe and forming an inclined plane surface abutted by a corresponding inclined plane surface **26** of an adjustment wedge **27**. The wedge **27** is generally triangular in form and has a flat or horizontal bottom **29** adjustable to vary the depth of the planing cut by movement of the inclined surface **26** along the inclined surface **25** toward and from the gap **22**. The inclined surface **26** of the wedge **27** has guide grooves **30** extending along opposite sides thereof, slidably engaged by corresponding ribs forming the outer margins of a recessed portion **31** of the inclined surface **25** of the base shoe **15**.

The triangular wedge **27** may be an aluminum casting and has a recessed top portion **32** having a central boss **33** extending upwardly therefrom into abutting engagement with the recessed portion **31** of the inclined surface **25** of the base shoe **15**. The inclined plane surface **25** of the base shoe **15** has a slot **35** extending therealong in registry with the boss **33**. A machine screw **36** extending through a washer **37** and the slot **35** and is threaded in the boss **33** to retain the traingular wedge **27** in position.

In FIGURE 4, the triangular wedge **27** is shown in an extreme position, to position the cutter blades **24** to make a maximum depth cut while in FIGURES 1 and 5, the triangular wedge **27** has been retracted to effect the taking of a fine or shallow cut. Suitable indicia (not shown) may be provided on the side wall of the shoe

15 and the triangular wedge 27 to indicate the depth of cut for the position of adjustment of said wedge. A simplified adjustment for adjusting the depth of cut of the plane has, therefore, been provided operable merely by the turning of a machine screw holding the triangular wedge to the base shoe of the plane in various selected positions of adjustment in accordance with the desired setting of the cutting depth of the planer blades.

The base shoe 10 also has an upstanding central boss 39 at its forward end into which is threaded an upwardly projecting handle grip 40 for the plane.

The base shoe 15 forms a mounting for a motor 41 extending thereacross and to one side of said base shoe. The mounting of the motor 40 on the base shoe 15 spaces the motor casing above said base shoe a distance sufficient to provide sufficient clearance below the motor casing, to permit surface planing when the fence 11 is removed from the base shoe. The motor has a hollow split handle 43 extending upwardly and rearwardly therefrom.

The handle 43 is shown as being in the form of an annular sector of a circle and as being connected to the motor casing by radial spokes or ribs 44. The split handle has a hollow interior portion 45 for the starter switch (not shown) for the motor. The starter switch is operated by a trigger 46 in a convenient location to be gripped by the fingers, while holding the plane for planing. The switch within the handle may be a type of safety switch in which the motor 41 is de-energized when pressure is relieved from the trigger 46, and commonly called a "dead man" safety switch.

The motor 41 may be a conventional form of high speed electric motor and has a toothed motor pinion or pulley 47 meshing with and driving a cogged belt 50, commonly known as a timer belt. The cogged belt 50 in turn meshes with and drives a toothed pulley 51 coaxial with and shown in FIGURE 3 as being formed integrally with the cutter block 23. A positive non-slipping drive is thus provided from the motor to the cutter block for driving said cutter block at a sufficiently high speed to effect efficient planing, the speed of rotation of said cutter block being in the order of 14,000 r.p.m.

Referring now to FIGURE 3 and the mounting of the cutter block 23 in the gap 22 between side walls 53 and 54 of the base shoe 15, the cutter block 23 has a central bore or drilled portion 55 having flanged sleeve bearings 56 extending therein from opposite ends thereof. The flanged portions of the sleeve bearings 56 are engaged by annular ribs 57 extending outwardly of opposite sides of the cutter block 23. Said sleeve bearings are mounted on a hollow shaft 59 extending through the bore 55 and mounted at its ends in boss portions 52 formed integrally with the side walls 53 and 54. The hollow shaft 53 has a central drilled portion 63 leading downwardly of said shaft into the space between the sleeve bearings 56. A set screw 60 threaded in a top wall portion 61 of a downwardly opening recessed portion 62 of the boss 52 formed integrally with the wall 53 engages a drilled portion 58 of the shaft 59 and locates the drilled hole 63 in the center of said hollow shaft to lead downwardly between the bearings 56. The drilled hole 63 thus forms an oil hole to conduct oil placed into the hollow shaft 59 from either end thereof to the central portion of the block 23 between the sleeve bearings 56 to oil said bearings by the oil in the interior of the cutter block 23 and flowing to opposite ends thereof. Washers 65 are placed on the hollow shaft 59 between the flanges of the flanged bearing sleeves 56 and the insides of the walls 53 and 54, to space the cutter block 23 midway between the walls 53 and 54 and to take up end thrust on said cutter block. Opposite ends of the hollow shaft 59 are closed by end caps 66, 66 which may be snapped thereon and removed to accommodate oiling of the bearings 56 for the cutter block.

The cutter block 23 has opposite parallel plane surfaces 67 spaced equal distances from the axis of rotation

of said cutter block, and extending chordally of the arc of rotation of said cutter block, and forming abutment surfaces for the cutter blades 24. Spaced bolt holes 69 elongated in cross-section lead from the plane surfaces 67 through the cutter block and open into recessed portions 70 of the cutter block and accommodate adjustment of the cutter blades 24 with respect to the cutter block. The recessed portions 70 have abutment surfaces 71 parallel to the surfaces 67, and shown in FIGURE 8 as extending diametrically of the axis of rotation of said cutter block. The abutment surfaces 71 are abutted by nuts 72 threaded on bolts 73 retaining the cutter blades 24 to the plane surfaces 67 of the cutter block 23.

As shown in FIGURES 7 and 8, the cutter blades 24 have spaced rectangular holes 74 leading therethrough to be engaged by squared shank portions 75*a* of the bolts 73, herein shown as being carriage bolts. The squared shank portion 75*a* of the bolts 73 snugly fit in the rectangular holes 74, and the squared shanks are of sufficient length that they bear against the plane faces 67 when tightened. This prevents shifting of the cutter blades and relieves the cutter blades from tightening forces. The bolt holes 69, 69, however, form a means to accommodate adjustment of the cutter blades 24 with respect to the cutter block 23.

The cutter blades 24 may be stamped from cold roll steel and may then be ground and case hardened and honed. A suitable material providing long life for the blades is #1018 c.r.s.

The base shoe part defining the rear wall of the gap 22 between the horizontal plane surface 21 and the forwardly spaced inclined surface 25 of the base shoe part conforms to the arc of rotation of the cutting edges of the cutter blades 24 and is spaced radially outwardly therefrom, as indicated by reference character 75. A forward wall 76 of the gap 22 extends upwardly of the inclined surface 25, and is inclined in a forward direction as it extends upwardly of said inclined surface, to provide sufficient clearance to accomodate the cuttings or shavings to be impelled by the cutter blades 24 to and out one end of a chip ejector passageway 77 formed on the underside of a cover 79 for the cutter block 23 and cogged belt 50. The side wall 53 extending across the gap 22 has a chip ejector recess 80 formed therein cooperating with the passageway 77 to accommodate the ejection of chips to one side of and downwardly of the base shoe 15.

The cover 79 has an elonated side guard portion 81, conforming generally to the form of the cogged belt 50, motor pulley 47 and toothed pulley 51, to guard said cogged belt and pulley, and is secured to one end of the motor 41 as by a machine screw 83. The cutter block cover 79 also has a cutter guard portion extending partially around the cutter block 23 and cutter blades 24 and terminating into a chip ejector portion 85 having the chip ejector passageway 77 extending along the inside thereof. The chip ejector portion 85 has spaced ears 86 extending forwardly therefrom abutting the top surfaces of bosses 87 formed integrally with the base shoe 15 and extending upwardly therefrom and secured thereto as by machine screws 88. The interior of the cutter guard 79 has an interior wall 90 forming a continuation of the wall 75 and terminating at its advance end into an upright wall interior portion 91 of the chip ejector cover 85. The interior wall portion 91 forms a rear wall of the chip passageway 77. The wall 91 diverges from an end wall 92 of the chip passageway 77 and wall 54 thereof, with respect to the upright wall 76, to form a chip passageway of increasing cross-sectional area from the closed end to the discharge end of the chip ejector cover 85. The chip ejector cover 85 extends to one side of the wall 53 and has a downwardly turned discharge end 95 spaced outwardly of the wall 53 and discharging the cuttings to one side of the base shoe 15 and downwardly toward the ground.

The chip ejector cover **85** and converging passageway **77** extending along the interior of said cover thus effect the ejection of the chips beyond and to one side of the base shoe **15** by the impelling action of the cutter blades **24** and cutter block **23**, in a simple and effective manner without the use of the usual blowers or suction devices.

While I have herein shown and described one form in which my invention may be embodied, it may readily be understood that various variations and modifications in the invention may be attained without departing from the spirit and scope of the novel concepts thereof as defined by the claims appended hereto.

I claim as my invention:

1. A hand plane comprising a base shoe having a horizontal bottom surface extending for a greater portion of the length thereof and having an inclined surface spaced in advance of said horizontal surface and inclined upwardly with respect to said horizontal surface toward the outer end of said base shoe, said base shoe having a vertically extending gap between said surfaces, and side walls extending across said gap, a hollow shaft stationarily mounted in said side walls and having a cutter block journalled thereon between said side walls, said cutter block having a toothed pulley extending from one end thereof and having oppositely facing cutter blades extending therefrom in planes parallel to a diametral line extending through the axis of rotation of said cutter block and spaced equal distances from said diametral line on opposite sides of said line, a motor mounted on said base shoe above said horizontal motor shaft spaced from and parallel to the axis of rotation of said cutter block, and a cogged belt drive between said motor shaft and said toothed pulley.

2. A hand plane in accordance with claim **5** wherein the cutter block and toothed pulley are integral and wherein sleeve bearings at opposite ends of said hollow shaft provide a bearing support for said cutter block on said hollow shaft.

3. In a hand plane, a base shoe having a horizontal bottom surface extending for a greater portion of the length thereof and having an inclined surface spaced in advance of said horizontal bottom surface and inclined upwardly with respect to said horizontal bottom surface toward the outer end of said base shoe, said base shoe having a gap between said surfaces and side walls connecting said surfaces together, a shaft mounted in said side walls having a cutter block rotatably mounted thereon, said cutter block having oppositely extending cutter blades mounted thereon and extending therefrom in planes parallel to a diametral line extending through the axis of rotation of said cutter block and spaced equal distances from opposite sides of said diametral line, a motor mounted on said block above said horizontal bottom surface and having a shaft parallel to but spaced from the axis of rotation of said cutter block, a cogged belt drive connection from said motor to said cutter block, and means cooperating with said cutter block and blades for ejecting the cuttings to one side of said base shoe comprising an arcuate wall defining a rear wall of said gap and conforming to but spaced from the arc of rotation of said cutter blades and a vertical front wall extending upwardly of said inclined surface of said base shoe and spaced a substantial distance in advance of said cutter blades, an integral cutter blade cover and belt guard extending along the upper run of said belt from said motor and over said cutter block and blades and having an inner wall forming a continuation of said arcuate rear wall and terminating in advance of the axis of rotation of said cutter block into a wall extending outwardly of said arcuate inner wall, generally radially of the axis of rotation of said cutter block and an arcuate inner wall extending forwardly of said radially extending inner wall and merging into said front wall, and with said generally radially extending rear wall and front forming a diverging chip ejecting passageway opening at its larger end portion to one side of said cutter block for effecting the ejection of chips to one side of said base shoe impelled by the rotary action of said cutter block and blades.

4. In a hand plane, a base shoe having a horizontal bottom surface extending for a greater portion of the length thereof and having an inclined surface spaced in advance of said horizontal bottom surface and inclined upwardly with respect to said horizontal bottom surface toward the outer end of said base shoe, said base shoe having a gap between said surfaces and side walls connecting said surfaces together, a shaft mounted in said side walls having a cutter block rotatably mounted thereon, said cutter block having oppositely extending cutter blades mounted thereon and extending therefrom in planes parallel to a diametral line extending through the axis of rotation of said cutter block and spaced equal distances from opposite sides of said diametral line, a motor mounted on said block above, said horizontal bottom surface and having a shaft parallel to but spaced from the axis of rotation of said cutter block, a cogged belt drive connection from said motor to said cutter block, and means cooperating with said cutter block and blades for ejecting the cutting to one side of said base shoe comprising an arcuate wall defining a rear wall of said gap and conforming to but spaced from the arc of rotation of said cutter blades and a vertical front wall extending upwardly of said inclined surface of said base shoe and spaced a substantial distance in advance of said cutter blades, an integral cutter blade cover and belt guard extending from said motor along the outside and upper run of said belt forwardly over said cutter block and blades and having an inner wall forming a continuation of said arcuate rear wall and terminating in advance of the axis of rotation of said cutter block and forming a chip ejecting passageway diverging towards its discharge end, said forwardly mounted on said block above said horizontal bottom surextending arcuate wall of said chip ejecting passageway having a downwardly directed outer end spaced outwardly of said base shoe and directing the chips downwardly to one side of said base shoe.

5. In a hand plane, a base shoe having a horizontal bottom surface extending for a greater portion of the length thereof and having an inclined surface spaced in advance of said horizontal bottom surface and inclined upwardly with respect to said horizontal bottom surface toward the outer end of said base shoe, said base shoe having a gap between said surfaces and side walls connecting said surfaces together, a shaft mounted in said side walls having a cutter block rotatably mounted thereon, said cutter block having oppositely extending cutter blades mounted thereon and extending therefrom in planes parallel to a diametral line extending through the axis of rotation of said cutter block and spaced equal distances from opposite sides of said diametral line, a motor mounted on said block above said horizontal bottom surface and having a shaft parallel to but spaced from the axis of rotation of said cutter block, a cogged belt drive connection from said motor to said cutter block, and means cooperating with said cutter block and blades for ejecting the cutting to one side of said base shoe comprising an arcuate wall of said base shoe defining a rear wall of said gap and conforming to but spaced from the arc of rotation of said cutter blades and an upright front wall of said base shoe extending upwardly of said inclined surface of said base shoe and spaced a substantial distance in advance of said cutter blades, an integral cutter blade cover and belt guard extending forwardly from said motor along the top and sides of said belt and over said cutter block and blades, said cutter blade cover having an interior wall forming a continuation of said arcuate rear wall of said base shoe and extending over said cutter block end terminating forwardly of the axis of rotation of said cutter block, said cutter block cover having an inner radial wall extending generally radially outwardly of said interior wall of said cover and extending to one side of

said base shoe and converging toward said upright forward wall of the gap between said bottom surfaces of said base shoe, and a downwardly curved wall extending forwardly of said radial wall toward said upright forward wall of the gap in said base shoe, said radial and last mentioned downwardly curved wall cooperating with said front wall of said base shoe to form an outwardly diverging chip ejecting passageway effecting the ejection of the chips to one side of said base shoe impelled by rotational movement of said cutter block and blades.

6. In a hand plane, a base shoe having a horizontal bottom surface extending for a greater portion of the length thereof and having an inclined surface spaced in advance of said horizontal bottom surface and inclined upwardly with respect to said horizontal bottom surface toward the cutter end of said base shoe, said base shoe having a gap between said surfaces and side walls connecting said surfaces together, a shaft mounted in said side walls having a cutter block rotatably mounted thereon, said cutter block having oppositely extending cutter blades mounted thereon and extending therefrom in planes parallel to a diametral line extending through the axis of rotation of said cutter block and spaced equal distances from opposite sides of said diametral line, a motor mounted on said block above said horizontal bottom surface and having a shaft parallel to but spaced from the axis of rotation of said cutter block, a cogged belt drive connection from said motor to said cutter block, and means cooperating with said cutter block and blades for ejecting the cutting to one side of said base shoe comprising an arcuate wall defining a rear wall of said gap and conforming to but spaced from the arc of rotation of said cutter blades and a vertical front wall extending upwardly of said inclined surface of said base shoe and spaced a substantial distance in advance of said cutter blades, a cutter blade cover extending over said cutter block and blades and having an interior wall forming a continuation of said arcuate rear wall of said gap in said base shoe and terminating in advance of the axis of rotation of said cutter blade, said cutter block cover having an inner radial wall extending generally radially outwardly of said interior arcuate wall and extending to one side of said base shoe and converging toward said upright forward wall of the gap between said bottom surfaces of said base shoe as it extends transversely of said base shoe, and a downwardly curved wall extending forwardly of said radial wall toward said forward wall of the gap in said base shoe, said radial wall and said last mentioned downwardly curved wall extending beyond and diverging to one side of said base shoe and forming a diverging chip ejecting passageway having a downwardly directed outer end portion for directing the chips impelled along said chip ejecting passageway by the rotary action of said cutter block and blade downwardly to one side of said base shoe.

7. In an electric hand plane, a base shoe having a horizontal bottom surface and having parallel side walls extending beyond said bottom surface, a hollow shaft mounted in said side walls and extending across the forward end of said horizontal bottom surface, sleeve bearings mounted on said shaft and extending inwardly of said side walls, an integral cutter block and toothed pulley mounted on said sleeve bearings and having oppositely facing parallel cutter blades extending chordally of the arc of rotation of said cutter block, a motor mounted on said base shoe rearwardly of said cutter block, a cogged belt drive connection between said motor and said toothed pulley, said hollow shaft having removable end caps to accommodate the introduction of oil in the hollow interior thereof and having an oil hole leading from the bottom thereof to the interior of said cutter block, between said sleeve bearings, to effect the lubrication of said sleeve bearings by the introduction of oil into said hollow shaft.

8. In an electric hand plane, a base shoe having a horizontal bottom surface and having parallel spaced side walls extending beyond the forward end of said horizontal bottom surface, a sleeve mounted in said side walls and extending across the forward end of said horizontal bottom surface, sleeve bearings mounted on said sleeve and extending inwardly of said side walls, an integral cutter block and toothed pulley mounted on said sleeve bearings, a motor on said base shoe and a cogged belt drive connection between said motor and said toothed pulley, said cutter block having oppositely facing parallel surfaces having oppositely facing cutter blades mounted thereon, said cutter blades having a plurality of apertured portions having rectangular walls, bolts having rectangular shank portions having engagement with said rectangular walls of said apertured portions and slightly longer than the thickness of said cutter blades and said cutter block having slots leading therethrough registering with said apertured portions of said cutter blades, for receiving said bolts, for bolting said cutter blades to said block and accommodating adjustable movement of said cutter blades with respect to said cutter block.

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