

Feb. 19, 1946.

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2,395,158

POWER DRIVEN HAND PLANE

Filed Dec. 18, 1943

2 Sheets-Sheet 1

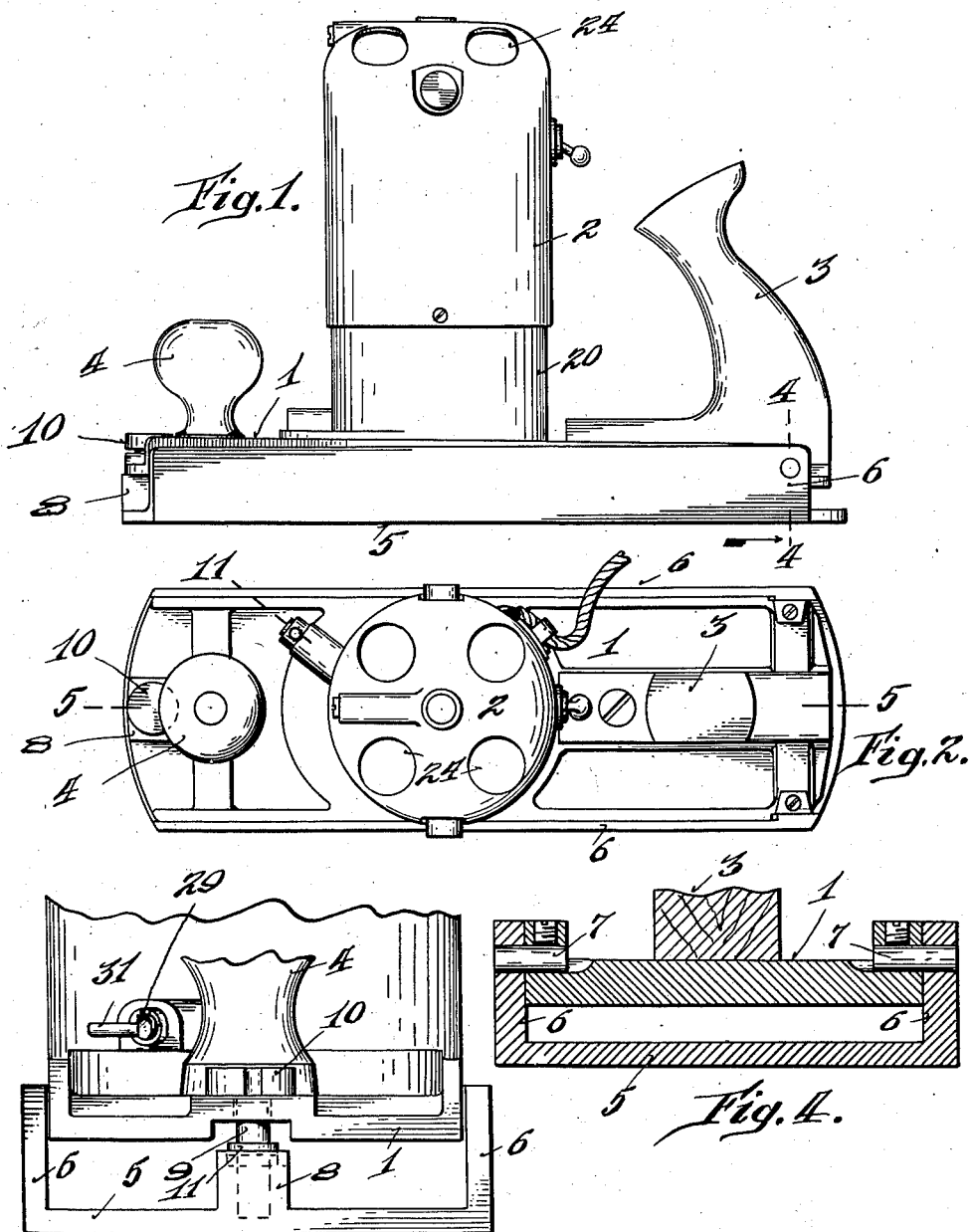


Fig. 3.

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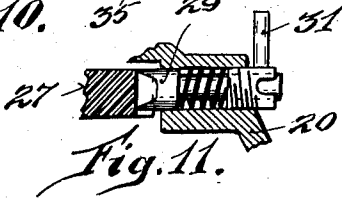
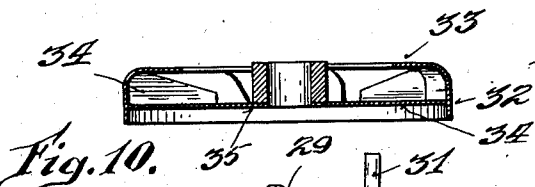
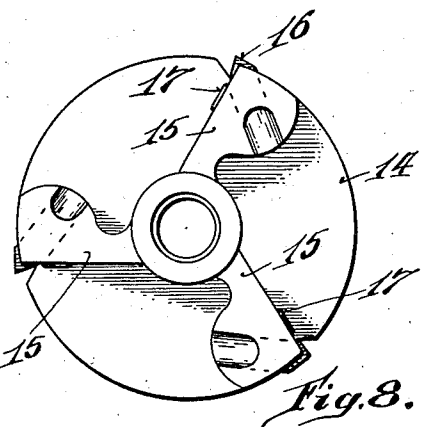
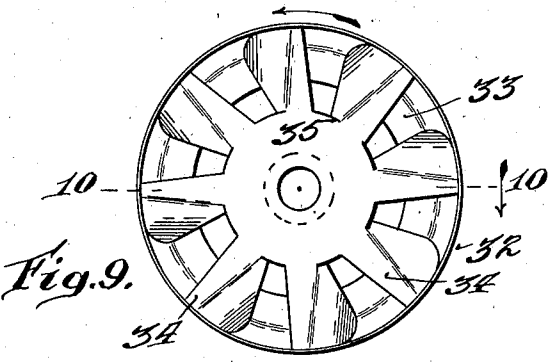
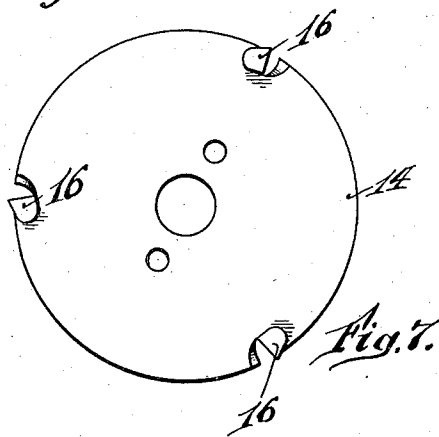
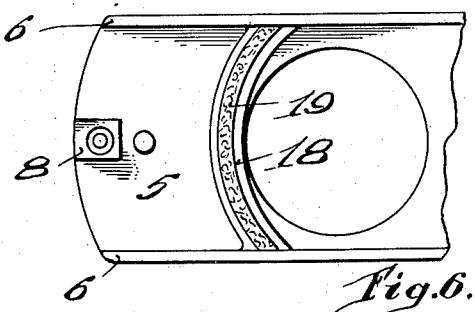
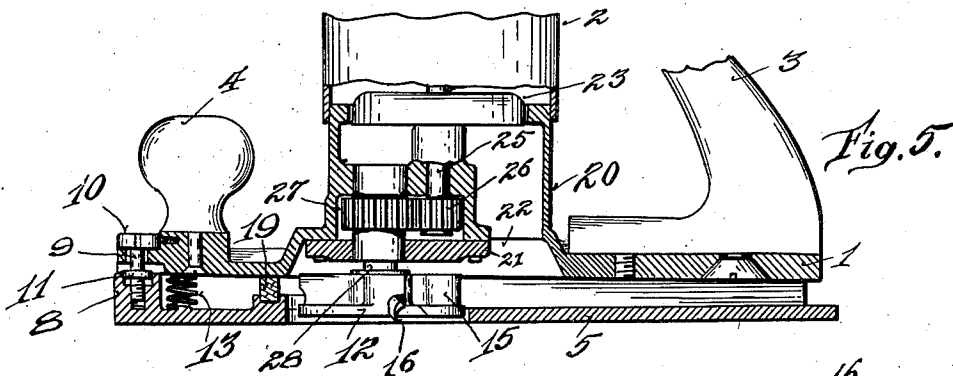
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POWER DRIVEN HAND PLANE

Filed Dec. 18, 1943

2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

2,395,158

## POWER-DRIVEN HAND PLANE

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Application December 18, 1943, Serial No. 514,792

1 Claim. (Cl. 145—5.1)

This invention relates to improvements in electric power driven hand tools for wood planing.

An object of the invention is to provide a wood planing hand tool with a stock, pivotally mounted at one end upon a corresponding end of a flat soled shoe for depressing the stock, and controllably protrude a power operated cutter of the stock through an aperture in the shoe to an active or work penetrating degree from the plane work bearing sole face of the shoe.

Another object of the invention is to provide a wood planing hand tool having a stock movably mounted upon a work bearing shoe, the stock carrying an electric motor and motor driven rotary cutter, the cutter upon relative movement of the stock and shoe positioned to a controlled cutting degree protrudingly from the work bearing face of the shoe. The cutter therefore is active upon an advancing movement or stroke of the tool, with the depth of the cut regulatable, and any drag of the cutter is prevented as the tool is drawn backward.

Another object is to provide a hand plane with a rotary power driven cutter having its rear side constituting an impeller for centrifugal dispersion of the shavings or cuttings from the cutter bit, into a discharge passage leading to the rear end of the plane, aided by an air blast delivered from a revolving ventilating fan of an electric motor mounted upon the stock of the plane.

Another object of the invention is to provide a wood planing hand tool with a power driven rotary cutter disposed at an angle to the plane of the work to adapt the same to be effective within only a half cycle of each revolution for trailing the cuttings from the cutter.

Various other features and advantages of the invention will be more fully set forth in a description of the accompanying drawings, in which:

Figure 1 is a side elevation of the improved planing hand tool.

Figure 2 is a top plan view thereof.

Figure 3 is an enlarged elevation of the front end.

Figure 4 is an enlarged section on line 4—4, Figure 1.

Figure 5 is a section on line 5—5, Figure 2.

Figure 6 is a top plan view of the forward end of the shoe.

Figure 7 is a plan view of the cutter.

Figure 8 is a plan view of the rear side of the cutter.

Figure 9 is a plan view of the electric motor ventilating and discharge fan for the cuttings.

Figure 10 is a section on line 10—10, Figure 9. Figure 11 is an enlarged section on line 11—11, Figure 2.

Referring to the drawings, the tool preferably comprises a stock 1, intermediately or centrally upon its top side carrying an electric motor 2, with its armature shaft perpendicularly disposed, a hand handle 3 at the rear end of the stock, and a hand knob 4, at the opposite or forward end of the stock.

The stock is mounted within a channel form of shoe 5, having a flat or plane faced sole or surface for bearing upon the surface of the work to be planed or smoothed. The stock extends longitudinally of and is movable within the channel of the shoe, and has its rear end pivotally connected to the upstanding flanges 6, 6, of the shoe by means of pins 7, 7, fixed within the stock and laterally extended therefrom respectively from opposite sides thereof, and each engaged into an aperture through an adjoining flange of the shoe.

The shoe within its forward end, centrally of the web portion thereof, and at its upper side integrally is provided with a lug 8. The lug has a stop screw 9, threaded therein for vertical adjustment. The screw extends through a relatively enlarged aperture in the stock with its head 10, exposed for accessibility on the upper or top side of the stock, and provides an upper stop for retreating action of the swinging movement of the stock. The screw, midway of its shank, has a rigid collar or annular flange 11 for limiting the depressing movement of the stock, and regulatably controlling the cutting depth of the cutter.

The forward end of the stock is arranged to straddle the lug projecting from the shoe, and the head of the screw has its periphery notched to cooperate with a spring pressed detent seated within a boss, to which the front hand knob is attached. A spring 13, is interposed between the free or forward ends of the stock and shoe for automatically retreating the stock.

The web of the shoe has a cutter receiving aperture for protruding the rotary cutter 12, to a determined or cutting depth therethrough. The cutter is of multiple or plural bit type, with a bit holder of a structure to possess the characteristics of an impeller at its rear side. The bit holder therefore comprises a disc 14, having, integrally at its rear side a plurality of radial ribs 15, at uniform angular disposition, each functioning as an impeller vane and a bit stock for a cutter bit 16, engaged within a bore dis-

posed laterally and at an angle to the radial ribs of the holder. The bit exposes its cutting end or edge protrudingly from the face side of the disc, and at its periphery, and is secured in place by a set screw 17. The disc and ribs at the forward side of the cutting edge of the bit are notched to provide a throat or feed passage for the cuttings forcibly rearwardly discharged from the tool through a passage formed by the spacing between the bottom face of the stock and the shoe, to which the vanes or ribs of the tool holder are normally open.

The outer face of the tool holder is at all times disposed at an angle to the bottom plane of the shoe rendering the bits active while moving within the rear arc of each revolution of the holder. This is also effective for a discharge of the cuttings rearwardly of the tool, particularly as the bits have a uniform setting with their cutting edges in alignment, offering a relief to the bits in what may be termed the return arc of travel in each revolution of the holder.

The shoe at the forward side of the cutter receiving aperture, has the channel blocked by a wall 18, having its upper side grooved to receive and sustain an elastic packing 19, for maintaining a seal between the shoe and bottom face surface of the base of the stock to prevent any forward discharge of the cuttings.

The stock has a vertically cylindrical extension 20, at the upper side of the base, as a support or mounting for the electric motor 2. The cylinder 20, has a septum across its base providing a transmission casing sealed by a cover 21, at its lower side. The septum has an opening 22, there-through at the rear side of the cylinder and of curved form with a radius of approximately the inside dimension of the cylinder, to equal the width of the discharge passage providing an open port between the cylinder and discharge passage formed by the base of the stock and shoe.

The electric motor at its end connecting with the cylindrical support 20, has a fan 23, fixed to the armature shaft thereof, with an air intake through a plurality of large openings 24, in the top of the casing of the motor. The fan is of a character for passing a high volume and velocity air blast into the cylinder 20, and through the opening 22, in front of the effective arc of revolution of the cutter, thence into the horizontal discharge passage for a forcible discharge of the cuttings from the rear end of the plane. The air travels in a curve from the cylinder into the discharge passage creating a suction pressure and aided by the impelling action of the ribs or vanes of the cutter insures a complete dispensing of the cuttings as soon as released by the cutting bits.

The lower end of the armature shaft 25, of the electric motor 2, extends into the transmission chamber of the stock and has a pinion 26, fixed upon the end thereof in mesh with a gear 27, fixed upon a spindle 28, to the outer end of which the cutter bit holder is attached.

The tool bit holder is threaded upon the end of the spindle 28. The gear 27 on the spindle 28 is locked against rotation by a detent 29, slidably mounted with a boss integral with and extending from the base of the motor mounting cylinder 20. The detent at its outer end has a pin 31, extending laterally therefrom, for manipulating the detent. The pin is engageable into a notch in the head end of the bushing through which the shank of the detent is engaged for releasing the detent which is spring urged for a

locking connection with the teeth of the gear 27, holding the gear against rotation to permit the tool or bit holder to be removed or applied upon the spindle.

The cutter being exceedingly aggressive will readily develop an accumulation of cuttings to cause clogging unless rapidly and forcibly removed from the interior of the tool.

The structure of the cutter bit holder is characteristic to auxiliarily serve as an impeller for centrifugally expelling the cuttings from the cutter and into the receiving end of the discharge passage as soon as released by the bits, and thence conveyed through the discharge passage by an air blast delivered from the electric motor ventilating fan. It has, however, been experienced that the conventional electric motor ventilating fan will not produce an air current of sufficient velocity and volume to be of service for blowing or conveying the cutting through the discharge passage.

The structure of fan or blower rotor employed is exemplified in Figures 9 and 10 and comprises a flanged rim 32, with the annular flange 33, thereof disposed to the rear side or facing the end of the motor and provides a reduced area intake. The periphery of the rim is in close proximity to a cylindrical surface of the motor mounting cylinder 20, within which the rotor revolves, the gap being merely sufficient to permit freedom of rotor rotation. A plurality of radial vanes 34, are uniformly disposed within the rim with their outer ends fixed thereto. The vanes are formed of sheet material and combine as a unit with a central disc or hub portion 35, with which a portion of the vanes are in plane. The vane at one side deflects at an angle and meets and connects with the flange of the rim from which the radial plane portion of the vanes are offset. The fan rotation is in direction as indicated by the arrow Figure 9, the air being drawn in through the annular opening produced by the flange of the rim and thence deflected by the annular portion of the vanes and delivered from within the rim at a high velocity and volume and conducted into the discharge passage between the stock and shoe across the periphery of the impeller. The air blasts across the full rotating cutting arc of the bits in their traverse across the work. The cutting as formed by the bits are directed by the bit to the reverse side of the disc of the holder in front of the radial wall of the impeller vane or rib supporting the cutter bit and thereby expelled into the discharge passage and path of the traveling air currents from the blower or electric motor ventilating fan.

Having described my invention, I claim:

A wood planing tool, comprising: a shoe of channel form in cross section and having a plane work bearing surface, a stock extending lengthwise of the shoe and within the channel thereof, having its rear end pivotally connected to the corresponding end of the shoe, with its lower side spaced from the base of the channel of the shoe and therewith forming a passage for the rearward discharge of the cuttings, the swing of the stock limited for moving a rotative cutter, carried by said stock and traversing an aperture in the shoe, to protrude the cutter a determined degree beyond the plane work bearing surface of the shoe for work penetration upon depressing the stock and alternately to retract the cutter from the work and within the shoe, an electric motor mounted on said stock, a rotatable cutter bit holder carried by said stock in transmission con-

nection with said motor, the holder having a plurality of cutter bits with their cutting edges projecting from a face side of the holder to travel across the work surface and the reverse side of the holder formed to provide an impeller peripherally exposed to said discharge passage, the holder having an opening therethrough, respectively for each bit for leading the cuttings from each bit to the reverse side of the holder for cen-

trifugal expulsion from said holder into said passage, the cutter holder disposed at angle to the plane of the work surface of the shoe to render bits in relief from the surface of the work for a portion of each rotative cycle of the holder and means for regulating the swing of said stock to control the maximum degree of cutter bit work penetration.

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