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POWER OPERATED WOOD PLANER

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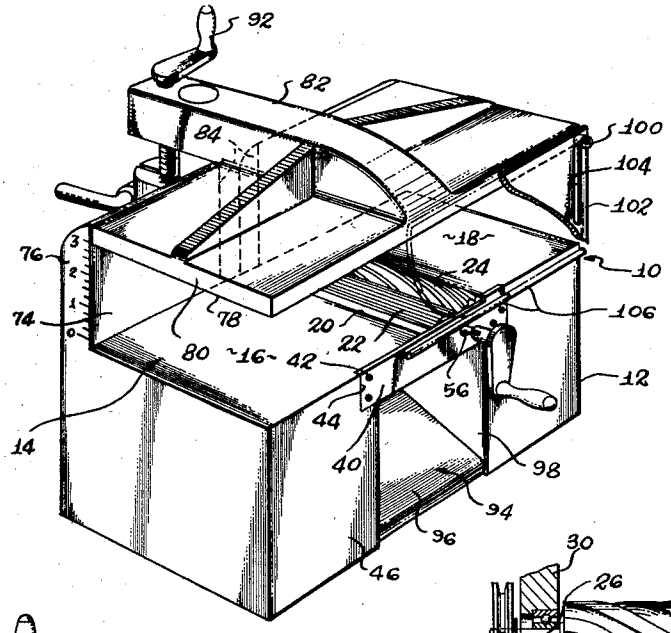

Fig. 1

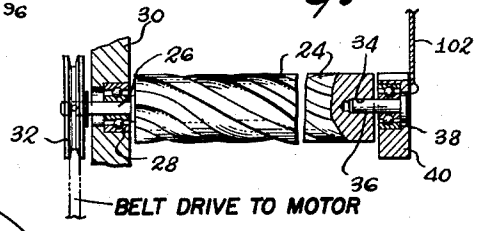

Fig. 4

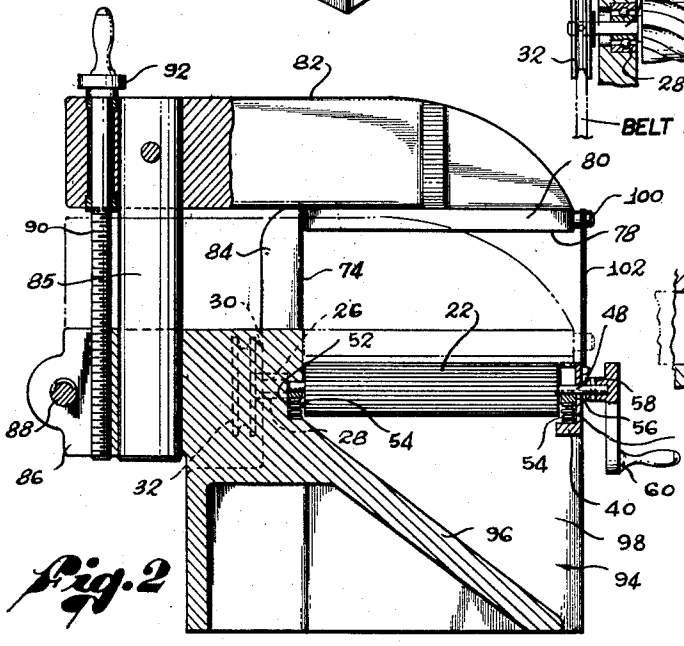

Fig. 2

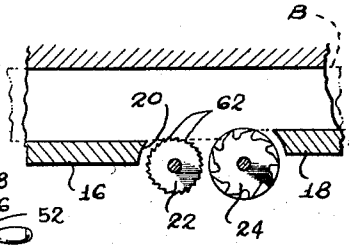

Fig. 3

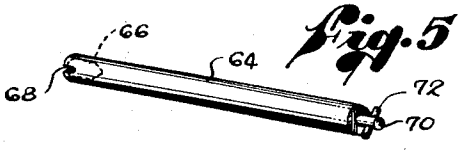

Fig. 5

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POWER OPERATED WOOD PLANER

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9 Claims. (Cl. 144—117)

This invention relates generally to wood working machines, and more particularly to a new and improved power driven thickness planer.

Conventional thickness planers are equipped with a horizontal table, a rotary cutter above and rotatable on an axis parallel to the table, and means for adjusting the vertical position of the table to vary the spacing between the latter and the cutter. In use, the table is set in accordance with the thickness of a piece of wood to be planed. The piece is then fed between the table and cutter in the well known manner.

One disadvantage of this existing planer construction has to do with the removal of the wood chips produced during operation of the planer. Thus, owing to the location of the cutter above the workpiece, the chips tend to be thrown out horizontally from the planer. This, of course, gives rise to a problem of maintaining the surrounding work space clean.

In the existing planers designed for commercial use, this problem is avoided by utilizing an exhaust system for continuously exhausting the chips from the planer to a collector. The relatively high cost of these exhaust systems, however, preclude their use in the average home workshop.

A second disadvantage of the existing planer construction is concerned with the manner of feeding a workpiece past the cutter. The more costly planers are provided with power driven feed rollers for this purpose. Because of the cost involved, however, it is impractical to provide small planers for home workshop use with such power driven feed rollers. In these small planers, therefore, the work is simply pushed by hand past the cutter.

Hand-feeding of the work in this way is undesirable for two reasons. First, there is the possibility of injury to the operator by contact of his hand with the cutter. Secondly, it is difficult, if not impossible, to feed the work at a uniform speed as is necessary to a high quality, planed surface.

Both the problem of the high cost of power driven feed roller and the disadvantages of manually pushing the work past the cutter can be avoided by utilizing a manually operable feed roller. That is, a substantially greater uniform rate of feed with complete safety and without the high cost of power feeds can be achieved by the use of a manual feed roller.

Insofar as we are aware, however, the existing small inexpensive planers for home workshop use have not been provided with even a manual feed roller. This is perhaps due to the fact that the feed roller would have to be located above the table in these planers. Mounting the roller operating handle directly on the roller shaft would, therefore, result in location of the handle in an inconvenient position above the table. Placement of the handle in any other location, of course, would require the use of gearing or other transmission means between the handle and roller which would add appreciably to the cost of the planer.

Other deficiencies of existing planers reside in their basic design and type of cutter they employ, which factors

result in complexity and high cost, and in the fact that the existing planers cannot be used as conventional jointers.

A broad object of this invention is the provision of a power operated thickness planer which avoids the above-noted and other deficiencies of existing thickness planers.

A more specific object of the invention is the provision of a power operated thickness planer having a simple, inexpensive construction so as to be ideally suited to home workshop use.

Another object is the provision of a power operated thickness planer of the character described which is so constructed as to greatly facilitate the collection of the wood chips produced during operation of the planer.

Yet another object is the provision of a power operated thickness planer having a simple and inexpensive manual feed roller for feeding work through the planer with facility, substantially uniform speed, and complete safety.

A further object is the provision of a power operated thickness planer which utilizes a helical cutter rather than the conventional cutter with cutter blades.

A still further object is the provision of a power operated wood working machine of the character described which may be used either as a jointer or a planer.

Yet a further object is the provision of a power operated thickness planer having a rugged and yet light weight and compact construction and which may be produced at substantially less cost than the existing planers of this general type.

Other objects, advantages and features of the invention will become readily apparent as the description proceeds.

Briefly, the objects of the invention are attained by the provision of a planer in which the work is fed along a table over a cutter rotatably mounted below and projecting slightly above the leading end of the table with respect to the direction in which work is fed through the planer. A reference surface of the present planer is afforded by the lower surface of an adjustable pressure or hold down plate overlying and paralleling the table.

This plate is adjustable toward and away from the underlying table to vary the vertical spacing between the lower reference surface on the plate and the cutter. Also rotatably mounted below and projecting slightly above the leading end of the table, ahead of the cutter, is a manual feed roller. This roller is spring loaded in an upward direction so as to maintain the work in flat contact with the reference surface.

In use, the plate is adjusted to set the spacing between the reference surface thereon and the cutter in accordance with the thickness of the board to be planed. The board is then fed between the plate and table to the feed roller, after which the latter is manually turned to advance the board over the cutter. Since the board is continuously pressed upwardly against the reference surface, a very accurate cut is achieved.

The upper surface of the trailing end of the table is located in a plane approximately tangent to the cutter so as to support the planed end of the board and thereby prevent any rocking of the latter as it is fed through the planer. The wood chips removed by the cutter are thrown by the latter into an inclined chute designed to empty into a suitable receptacle. Scattering of the chips about the work area surrounding the planer is thereby avoided.

Owing to the location of the feed roller below the table, the operating handle for the roller may be mounted directly on the roller shaft. The necessity of utilizing a costly gear transmission between the handle and roller is thereby eliminated.

The present planer employs a helical milling cutter rather than the conventional cutter equipped with flat cutting blades. The helical cutter has been found to be ideally suited to use in a wood planer, since it produces a superior planed surface either with the wood grain or

at right angles to it. Also, these cutters are produced in large quantities so as to be replaceable at minimum cost.

A highly advantageous feature of the invention resides in the fact that the upper plate is removable. This permits use of the present wood working machine as a jointer.

A better understanding of the invention may be had from the following detailed description taken in connection with the annexed drawings, wherein:

Fig. 1 is a view in perspective of the present planer;

Fig. 2 is a transverse section through the planer of Fig. 1;

Fig. 3 is a section through the cutter and feed roller of the planer during operation of the latter;

Fig. 4 is a section showing the manner of mounting the cutter of the present planer; and

Fig. 5 is a perspective view of a handle extension for the feed roller to be used when planing relatively wide boards.

Referring now to these drawings, the present planer will be seen to comprise a frame **10**. This frame may be constructed in any convenient manner but has been illustrated as being a single integral casting.

Frame **10** includes a hollow, generally rectangular base **12** which is open at its bottom, as shown. The top wall of the base forms a table **14**. This table comprises a leading table portion **16** and a trailing table portion **18**, the terms leading and trailing being related to the direction in which a workpiece is fed through the planer, as will be shortly more fully described. These table portions are longitudinally spaced to form an opening **20** therebetween which extends crosswise of the table.

Located within this opening are a feed roller **22** and a rotary cutter **24**. The feed roller is spaced ahead of the cutter, as shown.

Cutter **24**, which illustratively comprises a standard, helical metal milling cutter, has a central shaft **26** at its left end, as viewed in Fig. 4. This shaft is rotatably supported by a bearing **28** in the rear wall **30** of the base **12**. The cutter shaft extends rearwardly of the rear wall and mounts a removable V-belt pulley **32**.

Extending into the right end of the cutter **24** is an axial opening **34**. Received in this axial opening is a pin **36** which is rigidly fixed to the inner race of a ball bearing **38**. The outer race of this ball bearing is supported in a recess in a bearing support plate **40**. This plate is removably secured by screws **42** in a recess **44** in the front wall **46** of the base **12**.

Feed roller **22** has a central shaft **48**. Opposite ends of this shaft are slidably received in short vertical guideways **52** in the rear frame wall **30** and the bearing support plate **40**. Springs **54**, acting between the lower ends of these guideways and the shaft **48** resiliently bias the feed roller upwardly to its limiting position of Fig. 2.

The right end of the feed roller shaft extends beyond the bearing support plate **40** through a vertically elongated opening or slot **56**, as shown. Fixed in the extending end of this shaft is a cross pin **58**. A crank handle **60**, removably mounted on the end of the shaft, has a cross slot receiving the pin **58** to form a driving connection between the shaft and crank so as to permit turning of the feed roller by the crank.

As will shortly be seen, a workpiece may be fed through the planer by turning the feed roller. To this end, the roller has teeth **62** which bite into the work so as to prevent slippage between the latter and the feed roller.

Fig. 5 illustrates a crank extension to be used when planing wide workpieces. This extension comprises a shaft **64**, one end of which has an axial recess **66** and a cross slot **68** for receiving the end of the feed roller shaft **48** and the cross pin **58**. The other end of the extension shaft **64** has a reduced portion **70** mounting a cross pin **72** for receiving the crank **60**.

As shown most clearly in Fig. 3, the cutter **24** projects a slight distance, on the order of $\frac{1}{16}$ of an inch, above the upper surface of the leading table portion **16**. The upper surface of the trailing table portion **18**, on the other hand, is located in a plane approximately tangent to the cutter.

The rear wall of the base **12** extends above the table **14** to form a vertical guide **74** engageable with a workpiece during feeding of the latter through the planer. One edge surface of this guide has a scale **76** inscribed thereon. This scale, which may be calibrated in inches for example, has its zero line located in a plane tangent to the cutter **24**.

This scale indicates the vertical spacing between the cutter and the lower surface **78** of a pressure or hold down plate **80**, overlying and paralleling the table **14**. If desired, an additional scale, not shown, may also be provided for indicating the vertical spacing between the plate surface **78** and the table **14**.

Plate **80** is rigid on a horizontal arm **82** which is slidably received in a vertical slot **84** in the guide **74** and extends to the rear of the guide. The rear end of the arm **82** has a vertical bore in which is fixed a vertical rod **85**. Formed on and extending from the rear side of the base **12**, intermediate its ends, is a vertical split sleeve **86** in which the lower end of the rod **85** is slidably received. This split sleeve carries a clamp screw **88** by which the two halves of the split sleeve **86** may be drawn together to clamp the rod **85** against axial movement in the sleeve.

Journalled at its upper end in and fixed against axial movement relative to the rear end of the arm **82** is a screw-threaded shaft **90**. This shaft may be turned by a handle **92** on the upper end of the shaft.

The lower end of the shaft is threaded in the split sleeve **86**. The vertical spacing, as indicated by the scale **76**, between the under surface **78** of the plate **80** and the cutter, may, therefore, be adjusted by turning the threaded shaft **90** with the split sleeve clamp screw **88** released. The clamp screw may then be tightened to retain a fixed spacing between the surface **78** and the cutter.

Indicated at **94** is a wood chip chute in the base **12**. This chute is defined by a lower inclined wall **96** on the base, directly below the table opening **20**, and vertical side walls **98** which extend to the table **14**. The upper end of the chute, therefore, opens to the table opening **20**. The lower end of the chute opens through the front wall **46** of the base, as shown.

Mounted by a screw **100** on the forward, right hand end of the plate **80** is a generally sector-shaped, guard plate **102**. This guard plate has a long slot **104** through which the screw **100** extends.

The screw **100** and slot **104** provide a slide-pivot connection between the plate **80** and guard plate **102**, so that the latter may both pivot and move vertically on the plate **80**. The forward wall **46** of the base and the bearing support plate **40** heave elongate beads or shoulders **106** for supporting the guard plate in its normal position of Fig. 1 wherein it protects against accidental contact of the operator's hands with the cutter.

In use, a motor, not shown, is coupled by a V-belt to the cutter pulley **32**. The vertical spacing between the plate **80** and the cutter is set by the scale **76** to the thickness to which a board is to be planed, or to a greater value if more than one pass is required. The board B is then pushed by hand into the left end of the planer, as the latter is viewed in Fig. 1, between the table **14** and plate **80** to a position wherein the leading end of the board is located between the plate **80** and feed roller **22**, as shown in Fig. 3.

The feed roller springs **54** urge the roller and board upwardly to maintain the upper surface of the board in flat contact with the lower plate surface **78**. This surface forms the reference surface of the planer. The teeth **62** of the feed roller are also forced into the board.

The feed roller is now turned, by its handle **60**, to feed the board past the cutter during which the lower surface of the board is planed off. The chips removed by the cutter are thrown by the latter into the chute **94**. A suitable receptable may be located to receive the chips from the chute so as to maintain the surrounding work area clean.

Engagement of the board with the curved, rear edge of the guard plate **102** causes upward pivoting and translation of the latter to allow the board to pass below the plate.

After disengagement of the trailing end of the board from the feed roller, it is pulled by hand from the planer. Owing to the placement of the feed roller ahead of the cutter, the marks produced in the board by the feed roller teeth are removed by the cutter.

Also, it will be observed in Fig. 3 that because of the location of the trailing table portion **18** approximately in the plane of tangency to the cutter, the planed end of the board is supported by the trailing table portion.

Owing to the open throat-type construction of the planer, wide boards may be planed by first planing one-half of the board and then turning the latter end-for-end and planing its other half. The crank extension **64** (Fig. 5) may be used when working on such wide boards to permit location of the feed roller crank **60** beyond the outer edge of the board.

A highly desirable and advantageous feature of the present planer is that it may be converted to use as a conventional jointer by merely removing the upper plate **30**. In this case, the workpiece is pressed downwardly with sufficient force to depress the feed roller and thereby maintain the lower edge of the workpiece in flat contact with the table **14**.

It will be apparent from the foregoing description that there has been described and illustrated a planer which is fully capable of attaining the several objects preliminarily set forth.

It will be further apparent that numerous modifications in the design and arrangement of parts of the invention are possible within the scope of the following claims.

We claim:

1. A wood planer comprising a frame including a table having a flat work supporting surface, a plate perpendicularly spaced from said table and having a flat reference surface facing and substantially paralleling said table surface, means supporting said plate on said frame for adjustment of said plate toward and away from said table in a direction perpendicular to said surfaces, a cutter rotatably mounted on said frame for turning on an axis substantially parallel to said surfaces and located at the side of said table surface remote from said reference surface, said cutter projecting slightly beyond said table surface toward said reference surface, a workpiece being adapted to be fed between said plate and cutter, a feed roller rotatably mounted on said frame for turning on an axis substantially parallel to the cutter axis and located on the same side of said table surface as the cutter axis, the periphery of said feed roller projecting slightly beyond said table surface toward said reference surface for engagement with a workpiece, a handle mounted directly on said roller to permit manual turning of the latter, and yieldable means for urging the feed roller toward said plate to maintain the workpiece in flat contact with said reference surface during feeding of the work past the cutter.

2. The subject matter of claim 1 wherein the surface of said feed roller is provided with sharp edges for biting into a workpiece, said feed roller being located ahead of the cutter with respect to the direction in which a workpiece is fed past the cutter whereby the latter removes the marks produced in a workpiece by said sharp edges.

3. The subject matter of claim 1 wherein said table

is elongated in the direction in which a workpiece is fed past the cutter and comprises a leading portion and a trailing portion with respect to said direction of feed, said portions being spaced in said direction to define therebetween an opening extending crosswise of the table, said cutter and said feed roller being located in said opening and projecting slightly beyond the surface of said leading table portion, the plane of the surface of the trailing table portion being substantially tangent to the projecting portion of the cutter.

4. A wood planer comprising a frame, a normally horizontal plate having a normally lower, horizontal reference surface, means mounting said plate for vertical adjustment on the frame, a rigid, normally horizontal table on said frame below said plate, a workpiece being adapted to be fed in a given direction between said table and plate, said table comprising leading and trailing portions with respect to said direction which are spaced in said direction to form therebetween an opening extending crosswise of the table, said table portions having normally upper, horizontal work supporting surfaces, a rotary cutter rotatably mounted on said frame within said opening for turning on an axis parallel to and spaced below said table surfaces, the periphery of said cutter projecting slightly above the surface of said leading table portion, and a chute on said frame below and opening upwardly to said table opening for receiving wood chips removed from a workpiece by said cutter, said chute inclining downwardly and opening through a side of said frame for conveying the chips to a suitable receptacle.

5. A wood planer comprising a frame, an elongate, normally horizontal table rigid on said frame and including a pair of longitudinally spaced, table portions having normally upper, horizontal surfaces, one of which surfaces is disposed slightly below the other, said table portions defining therebetween an opening which extends crosswise of the table, a rotary, helical cutter rotatably mounted on said frame within said opening with its axis extending lengthwise of the opening and disposed below said table surfaces, a feed roller, upwardly acting spring loaded means rotatably mounting said roller on said frame within said opening for turning of the roller on an axis parallel to the cutter axes and disposed below said table surfaces, the periphery of said cutter projecting slightly above said one table surface and being approximately tangent to the plane of the other table surface and said spring loaded means biasing said roller upwardly beyond said one table surface, a handle removably fixed to the roller for turning the latter, a downwardly inclined chute on said frame below and opening upwardly to said table opening and opening downwardly through a side of said frame to catch chips from the cutter, a vertical guide wall along one longitudinal edge of and rising above said table, a normally horizontal plate above and substantially coextensive with said table, said plate having a normally lower, horizontal reference surface facing said table, said wall having a vertical slot intermediate its ends, an arm rigid on said plate and projecting slidably through said slot to the rear side of said wall, adjustable means supporting the rear end of said arm on said frame for vertical adjustment of said plate to vary the vertical spacing between said reference surface and cutter, and a scale for indicating said vertical spacing.

6. A wood planer comprising a frame including a lower horizontal work supporting table, a vertical guide along a rear edge of the table, a horizontal plate above the table, a horizontal arm rigid on said plate extending to the rear of said guide, a vertical post at the rear of said guide slidably supporting said arm on the frame for vertical movement of said plate toward and away from said table, an elevating means at the rear of said guide acting between said arm and frame to raise and lower the plate, a workpiece being adapted to be fed through the space between the table and plate, a rotary cutter on the frame below the table for planing the underside

of a workpiece fed through said space, means to rotate the cutter, and means on the frame to hold the workpiece up against said plate.

7. The subject matter of claim 6 wherein said guide has a vertical slot through which said arm extends to the rear of the guide.

8. The subject matter of claim 6 wherein said post is fixed at its upper end in the rear end of said arm, and said frame has means at the rear of said guide in which the lower end of said post is slidably received.

9. The subject matter of claim 6 wherein said post is fixed at its upper end in the rear end of said arm, said frame including a vertical split sleeve at the rear of said guide in which the lower end of said post is slidably received, and means to clamp said sleeve together to hold said plate in a fixed vertical position.

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