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Mochizuki

[11] **3,727,654**

[45] **Apr. 17, 1973**

[54] **PLANER MACHINE**

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[52] **U.S. Cl.** **144/120,** 144/129, 226/171, 83/436

[51] **Int. Cl.**.....**B27c 1/12**

[58] **Field of Search**.....144/114, 120, 129, 144/115; 226/171; 83/436, 437

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Attorney—Sughrue, Rothwell, Mion, Zinn & Macpeak

[57] **ABSTRACT**

A carpenter planer, having a lower stationary assembly mounting a stationary, yet adjustable cutter, and an upper movable assembly including a drive motor, an endless belt driven therefrom and a plurality of stock-feed parallel rollers are provided, said upper assembly being kept in suspended position through a rotatable vertical shaft and a spring attached thereto.

4 Claims, 9 Drawing Figures

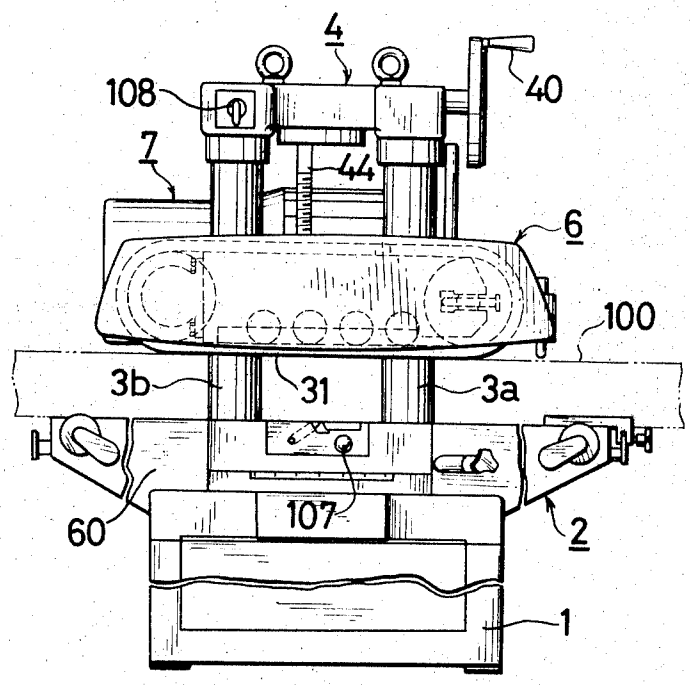


FIG. 1

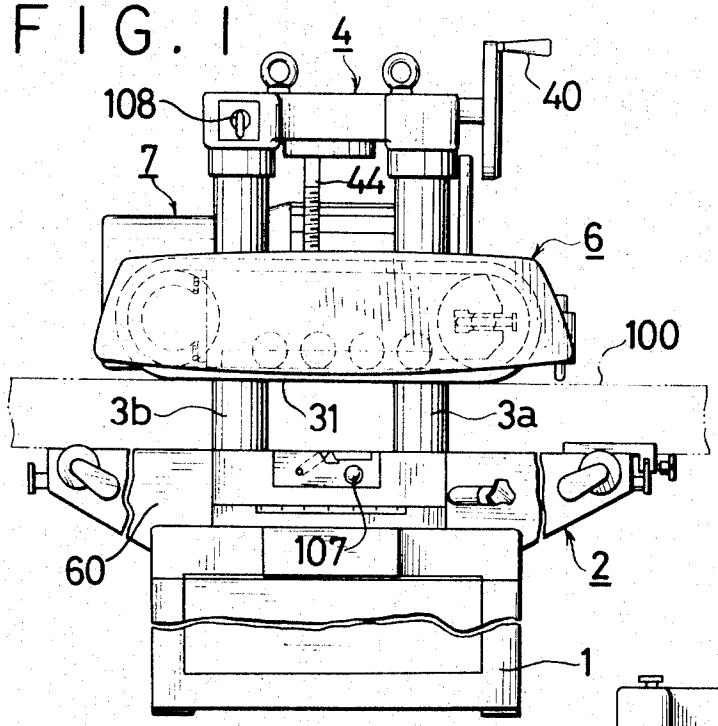


FIG. 2

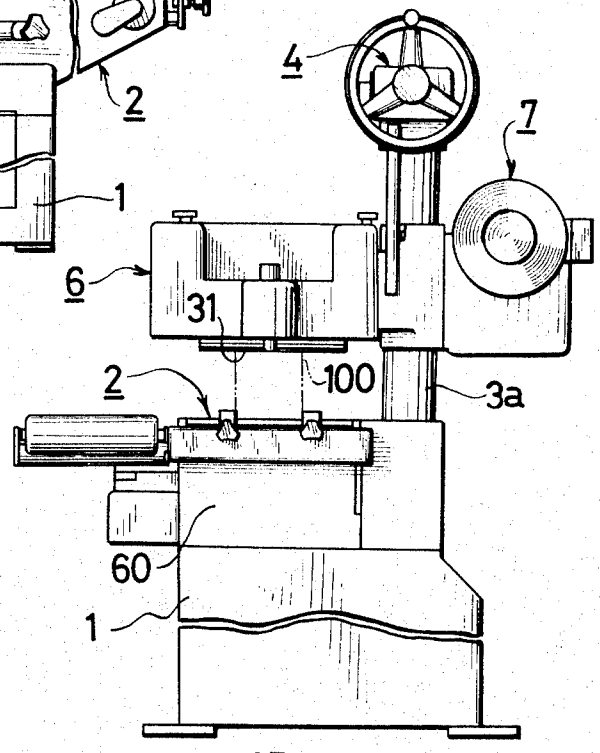


FIG. 9

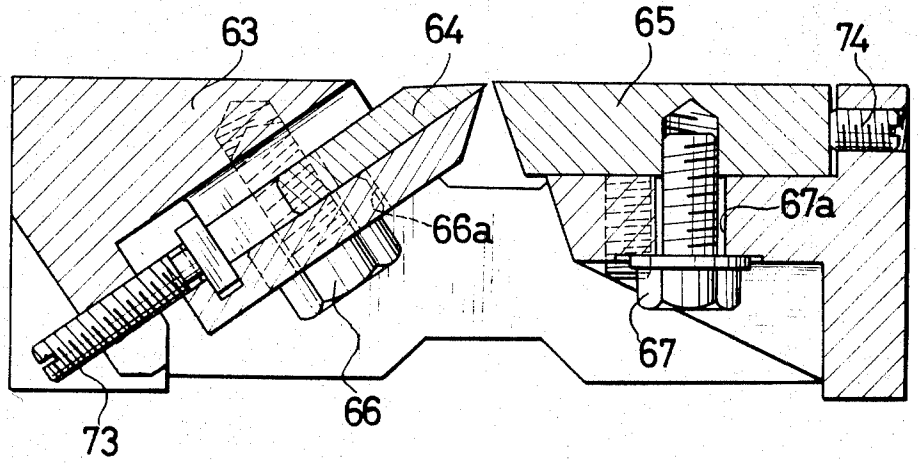


FIG. 3

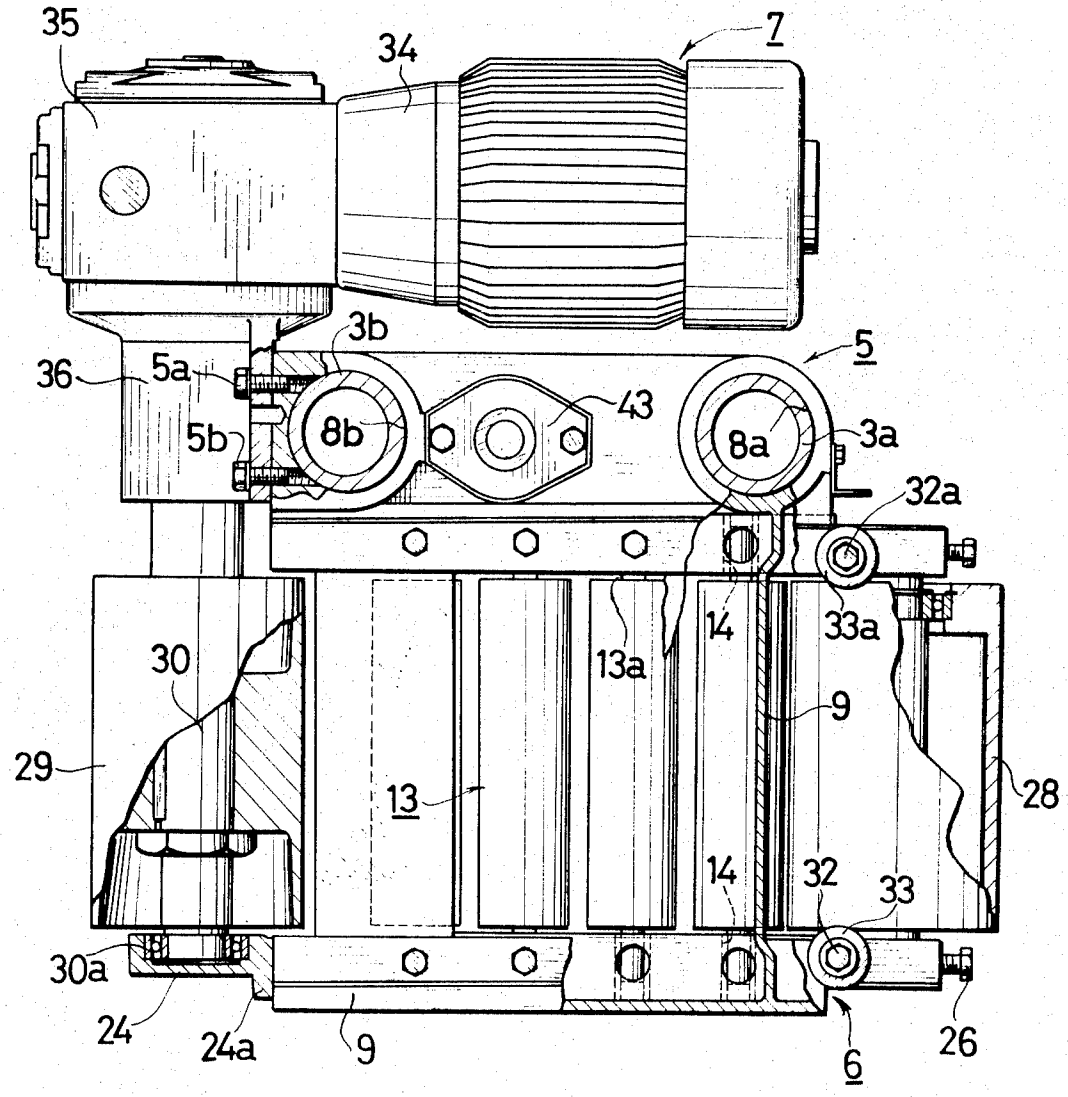

35
34
7
3b
36
5a
5
5b
8b
43
8a
3a
32a
33a
14
13a
30
9
29
28
13
14
32
33
30a
24
24a
9
6
26

FIG. 8

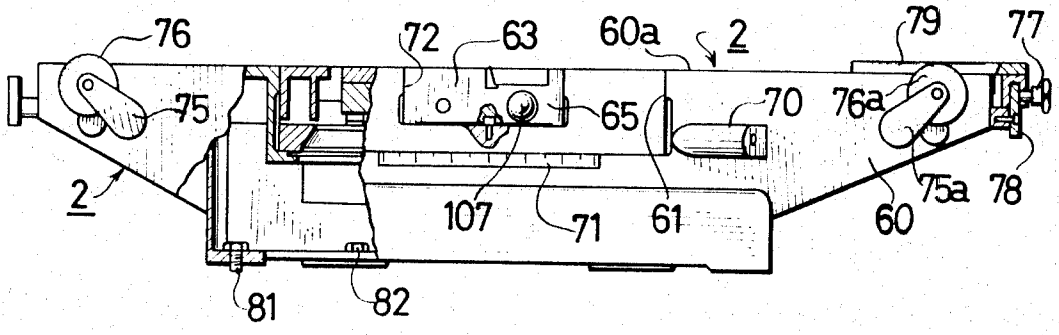

76
72
63
60a
2
79
77
75
65
70
76a
2
107
71
61
60
75a
78
81
82

FIG. 4

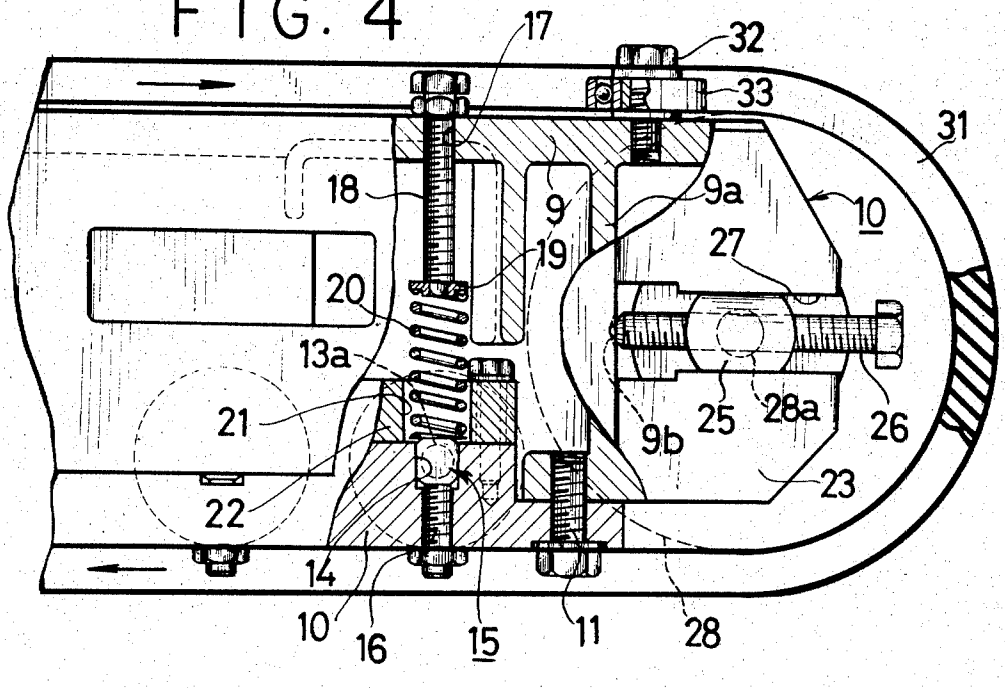

17
32
33
31
18
9
9a
10
19
27
20
13a
21
9b
25
28a
26
23
22
14
10
16
15
11
28

FIG. 5

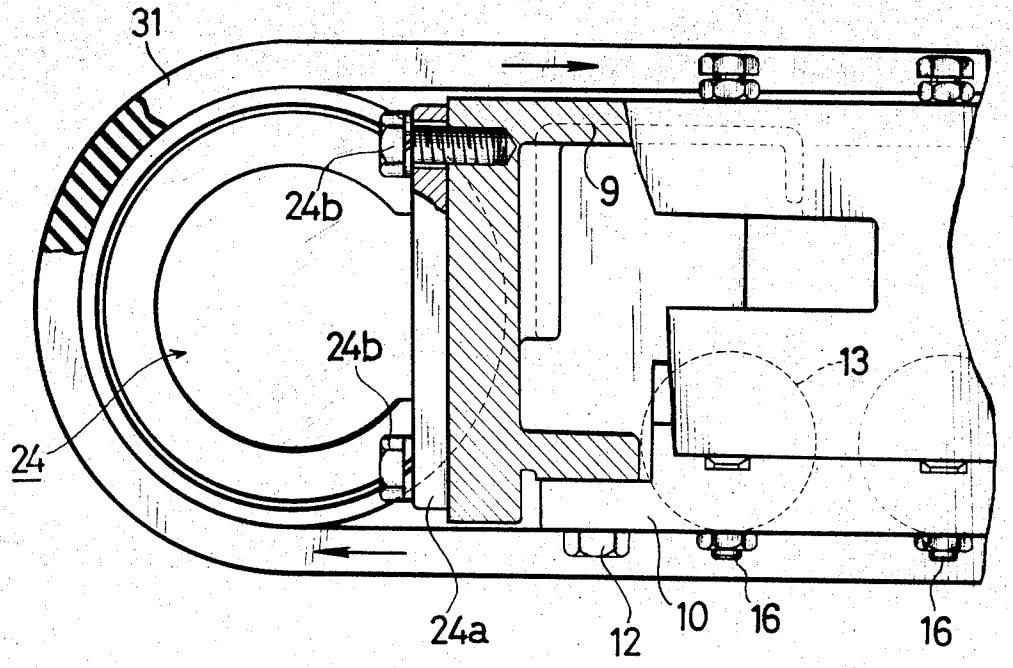

31
24b
9
24b
13
24
24a
12
10
16
16

FIG. 6

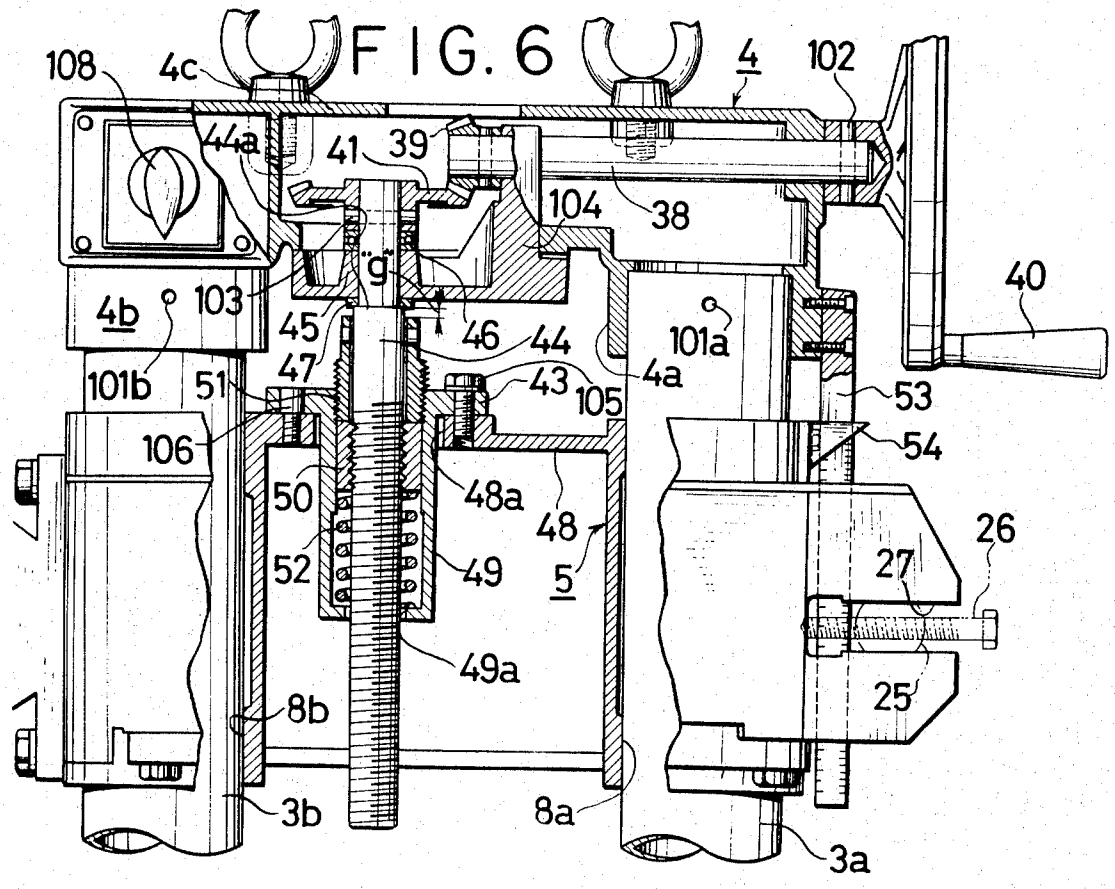
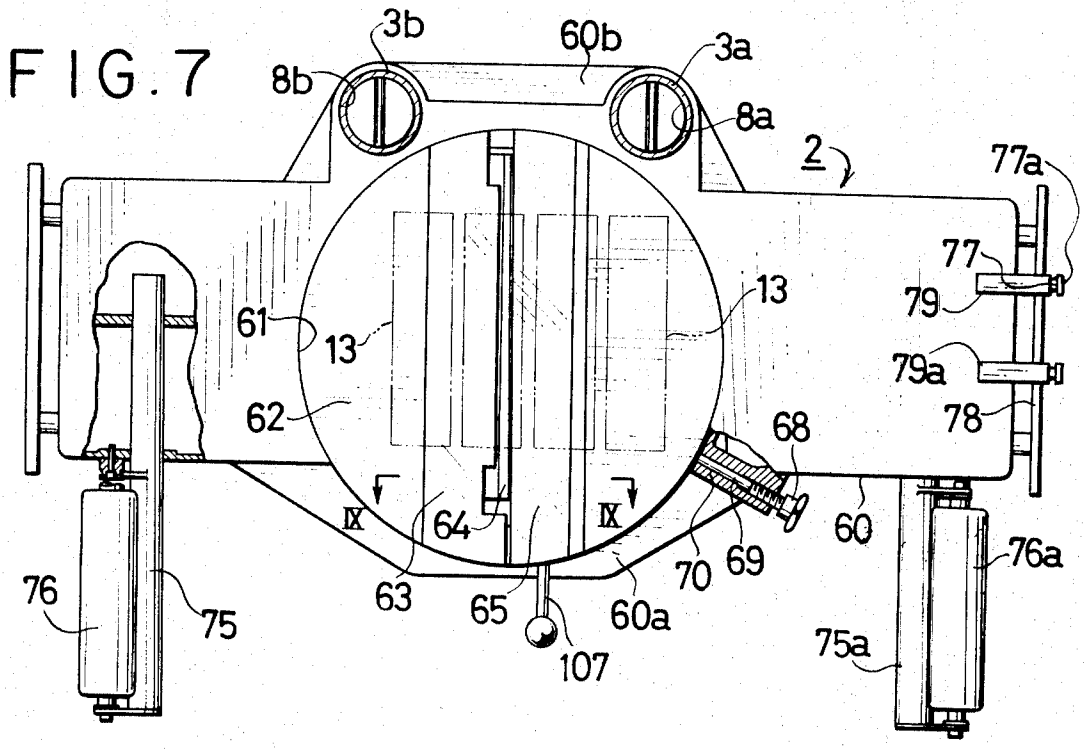

108
4c
4
102
44a
41
39
104
38
40
4b
103
45
46
44
101a
101b
51
47
43
105
4a
53
106
54
50
48a
48
26
52
49
5
27
49a
25
8b
3b
8a
3a

FIG. 7


3b
60b
3a
8b
8a
2
77a
77
79
13
61
13
79a
62
78
68
IX
IX
64
60
76a
76
75
63
65
70
69
60a
75a
107

PLANER MACHINE

This invention relates to improvements in and relating to wood planer machines or carpenter's planers for providing a smooth finish on the processed stock.

Conventional wood planer machines have generally such construction that the pressure and guide unit for the stock is fixed at a certain predetermined height on the machine and the cutter unit is mounted on a vertically adjustable table thereof, so as to achieve the required finished thickness of the stock.

When it is desired to use a plurality of such planer machines on line and in a gang series one after another, so as to cut a certain stock in a continuous and successive order on these machines to perform several different cuts on the stock for providing an overall heavy cut, a substantial difficulty has been encountered by differently adjusted heights of the machine tables which generally can not be set on a certain common plane by virtue of the differences in the height of the tables for providing different cutting depths.

It is therefore the main object of the present invention to provide a wood planer machine having a constant height table bearing a cutter unit and a pressurized stock-feeding unit which is adjustable in its height for meeting the required different cutting depths for the finished dimension of the stock, thereby providing a highly enhanced convenience for use of a ganged series of similar machines to machine the stock in a continuous and successive order and on line with easiness and high precision.

It is a further object of the invention to provide a wood planer machine of the above kind, capable of providing a resilient, well-balanced, and adjustable suspension of the pressurized stock feed unit highly adapted for surface finishing of the stock in a mass and precision working thereof.

Still a further object of the present invention is to provide a wood planer machine of the above kind, capable of machining a stock which may have a substantially wide and broad machining surface, yet with a substantially improved preciseness and at a high operating speed.

These and further objects, features and advantages of the invention will become more apparent when read the following detailed description of the invention by reference to the accompanying drawings illustrative of a preferred sole and representative embodiment of the invention.

In the drawings:

FIG. 1 is a front view of the wood-planing and finishing machine embodying the principles of the invention.

FIG. 2 is an end view of the machine when seen from right to left in FIG. 1.

FIG. 3 is an enlarged plan view of a stock feeder unit having an independent drive motor employed in the machine shown in the foregoing, wherein certain parts are broken away and a feeder belt has been omitted from the drawing, for showing inner operating parts more clearly.

FIG. 4 is a right-hand part of an enlarged front view of the stock feeding unit shown in FIG. 3, wherein, however, several parts have been broken away and several parts are shown in section, for more clearly showing inner working parts.

FIG. 5 is a left-hand part of a front view of the stock feeding unit shown in FIG. 3, wherein, several parts have been broken away and several parts are shown in section in the similar way.

FIG. 6 is a part of FIG. 1 shown, however, on an enlarged scale, wherein substantial parts have been shown in section.

FIG. 7 is an enlarged plan view of a tool-mounting and stock-guiding unit embodied in the machine shown generally in FIGS. 1–2.

FIG. 8 is a front view, partially broken away, of the unit shown in FIG. 7.

FIG. 9 is an enlarged sectional view taken substantially along the section line IX–IX′ shown in FIG. 7.

Referring now to the drawings, numeral 1 represents a rigid bed having substantially a box construction as shown, said bed being shown, however, in a substantially shortened way in its height for convenience of the drawing. A tool mounting and stock-guiding unit 2 having a ship's hull-like configuration when seen in FIG. 1 and a rectangular section in its main body, is fixedly mounted on the upper end of the bed by means of a plurality of fixing bolts as representatively shown at 81 and 82 in FIG. 8.

A pair of parallel and upright tubular pillars 3*a* and 3*b* are rigidly attached by their lower root ends to said unit 2, as may be most clearly understood from FIG. 7. At the upper ends of these pillars 3*a* and 3*b*, an operating unit, generally shown at 4, is rigidly attached thereto.

Supporting slide 5 is formed with a pair of round eye openings 8*a* and 8*b* through which the pillars 3*a* and 3*b* slidably pass, said slide 5 being made rigid with an upper supporting frame element 9 which is rigidly connected with a lower frame element 10 by a plurality of fixing bolts as at 11 and 12 (FIGS. 4 and 5). A plurality of guide rollers 13 are rotatably mounted in a horizontal plane on the lower element 10, as most clearly be seen from FIGS. 3 and 4.

The drive motor unit 7 comprises an electric motor 34 and a reduction gear box 35 mechanically connected therewith. The motor 34 is electrically connected through leads, not shown, to a commercial power source, again not shown, while the gear box 35 is formed with an output shaft bearing 36 rigidly connected with said slide member 5 by fixing bolts 5*a* and 5*b*. An output shaft 30 extends laterally from inside of said gear box 35 and the free end of said shaft 30 is rotatably mounted in end bearing housing 24 comprising antifriction bearing 30*a*. The housing 24 is mounted on the upper support element 9 by means of fixing bolts as at 24*b* (FIG. 5) and through an extension 24*a* made integral with said housing 24.

Drive roll 29 arranged in parallel to the rollers 13 is fixedly mounted on output shaft 30, while an idler roll 28 is rotatably mounted at the opposite side of the group of parallel rollers 13 and on the upper support element 9, as will be described more in detail hereinafter.

As seen from the foregoing, the weight of feeder unit 6 is substantially balanced out with that of drive motor unit 7 relative to the slide member 5, when seen in FIG. 3.

Lower frame element 10 is formed with two series of separated and rectangular recesses 14 along the upper

and lower sides of said element **10** when seen in FIG. **3** in correspondence to the stock feed rollers **13**, respectively. A bearing member **15** is positioned in each of these recesses **14** and rotatably receives a journal **13a** of the roller **13**. A pressure spring **20** is abutting at its lower end against bearing member **15** from above when seen in FIGS. **4** and **5**. An adjusting screw **18** passes threadedly through the upper wall part of the upper frame element **9** and abuts through a movable spring seat **19** on the upper end of each of said springs **20**. A further adjusting screw **16** passes threadedly through lower frame element **10** and abuts from below on the bottom surface of each of said bearing members **15**. By manual adjustment of these screws **16** and **18**, vertical position of the bearing member **15** and the tension of pressure spring **20** may be adjusted, so as to arrange each of stock feed rollers **13** at a predetermined vertical distance as measured from the upper surface **60a** of table **60** included in the unit **2**. An endless belt **31** is threaded around the drive and idler or driven rolls **29** and **28**, the inside surface of the lower run of the belt being kept in rolling contact with the feed rollers **13**.

Each of the rollers **13** is fitted naturally at its both ends with a pair of the aforementioned level-adjusting mechanisms, each including adjusting screws **16** and **18** and pressure spring **20**, although not specifically shown and described. The number of rollers **13** is shown as four as an example, but it can be reduced or increased from four, as occasion may desire.

As most clearly shown in FIG. **4**, upper frame element **9** is formed at its right-hand and front part with a mounting part **23** which is formed in turn with a guide slot **27** slidably receiving a bearing block **25** which receives rotatably the front end of the journal **28***a* (FIG. **4**) of idler roll **28**. Such bearing is arranged also at the rear end of the roll **28**, although not specifically shown and described for simplicity.

An adjusting screw **26** passes threadedly and horizontally through the bearing block **25** in FIG. **4**, the pointed inner end of said screw being received rotatably in a cone-shaped recess **9***b* formed on an intermediate wall part **9***a* of upper frame element **9**. By screwing the screw **26** inwardly the related front journal end of idler roll **28** and bearing block **25** are moved rightwards in FIG. **4**, whereby the stock feeder belt **31** is tightened. By turning the screw **26** in its opposite or loosening direction, bearing block **25** will be automatically shifted inwardly under the influence of the belt tension transmitted from the belt through idler roll **28** thereto.

On the upper surface of upper frame element **9**, a pair of bolts **32** are studded in proximity of the front and rear edge thereof, said bolts mounting rotatably respective guide rollers **33** and **33a** for the guidance of stock feed belt **31**, as most clearly seen from FIG. **3**.

As seen from FIG. **6**, the unit **4** includes a casing **4c** which is formed with a pair of downwardly opening cap portions **4a** and **4b**. In the assembled position shown, these cap portions are snugly mounted on the upper ends of pillars **3***a* and **3***b*, respectively, and rigidly held in position by means of fixing lateral pins **101***a* and **101***b*, respectively.

An operating shaft **38** is rotatably and horizontally mounted in the casing **4***c*, said shaft having a slightly projecting outer end on which an operating hand wheel **40** is fixedly mounted and held in position by means of a fixing pin **102**. A bevel pinion **39** is fixedly mounted on the inner end of said shaft **38** which meshes a bevel gear **41**.

A mounting piece **104** is fixed to the casing **4***c*, although the fixing means have been omitted from the drawing only for simplicity, and thrust bearing **46** is mounted on the mounting piece **104** for rotatably mounting said bevel gear **41**. A substantially threaded support shaft **44** passes through said mounting piece **104**, thrust bearing **46** and bevel gear **41**, the latter being attached fixedly on the upper end of said support shaft by means of a positioning pin **103**.

Support shaft **44** is formed at its intermediate point with a shoulder **44***a*, a collar ring **47** being inserted between the bottom surface of said mounting piece **104** and said shaft shoulder **44***a* for preventing relative movement between the shaft **44** and the bevel gear **41**. Thanks to this construction, the shaft **44** can rotate without changing its height when rotation in transmitted thereto from manipulating handle wheel **40** through operating shaft **38**, bevel pinion **39** and bevel gear **41**.

An intermediate portion **48** of slide member **5** extending between said openings **8***a* and **8***b* is formed with a further opening **48***a* and a cup-shaped member **49** passes therethrough and the flange **43** thereof is fixedly attached to said portion **48** by means of fixing bolts **105** and **106** and further threadedly coupled with a threaded sleeve **51**. The gap "g" formed between the lower surface of collar **47** and the upper end of sleeve **51** is shown on the drawing at its smallest possible size and it may be increased to a substantially large value, as will become clear as the description proceeds. Numeral **50** represents a tapped ring which is positioned within the interior space of said cup-shaped member **49** and kept in mesh with the support shaft **44** at an intermediate position along its entire length. A coil spring **52** is positioned within the interior space of the member **49**. As shown, the shaft **44** passes through a bottom opening **49***a* formed through cup-shaped member **49** further downwards. Members **50** and **49** can perform an axial movement relative to each other, allowing, however, no relative rotational movement therebetween. For this purpose, the contacting periphery of these two members may be of hexagonal configuration or the like, although not specifically shown. By the provision of said spring **52**, the rigid combination of several parts **49**, **43** and **5** is urged always resiliently in the downward direction, when seen in FIGS. **1**, **2**, and **6**.

By rotating hand wheel **40** in one or the other directions, the shaft **44** is rotated in the corresponding direction, as was briefly described hereinbefore. With rotation of shaft **44**, the ring **50** is threadedly moved upwards or downwards, as the case may be, and the slide member **5** carrying the units **6** and **7** will follow the movement. In this way, the positioning level of these units **6** and **7** can be modified as desired.

On the unit **4**, and in proximity to the manipulating hand wheel **40**, there is provided an indicating scale **53**, while an indicator **54** is fixedly mounted on slide member **5**, so as to cooperate with said scale, as seen in FIG. **6**. Therefore, the selected height of the unit **6** can be identified by observing the indicator **54** relative to scale **53**.

Tool-holding and stock-guiding unit **2** comprises an elongated stationary table **60**, the plane configuration thereof being clearly seen from FIG. **7**. This table **60** represents a truely and precisely plane and smooth upper surface, formed at its central portion when seen in the longitudinal direction with laterally bulged-out portions **60***a* and **60***b*, and with a substantially circular, forwardly opened recess **61**, a small turn table **62** being rotatably mounted in this recess.

Turn table **62** comprises a knife stock **63** having a generally and substantially rectangular vertical section and fitted as conventionally with a cutting tool assembly **64** and a guide member **65** for wood shavings, the both being detachably and adjustably attached to the knife stock **63** by means of respective fixing bolts **66** and **67**. These fixing bolts **66** and **67** pass through their bolt holes **66***a* and **67***a*, respectively with idle plays so that tool assembly **64** and guide member **65** can be adjusted in their attaching position, respectively, by adjustment of set screws **73** and **74**, as most clearly be seen from FIG. **9**.

At the front center of the table **60**, and in close proximity to the turn table, a readable scale **71** is fixedly mounted, so as to determine the selected turned position of the turn table, although the indicator similar to that shown at **54** and fixedly attached to said turn table is not specifically shown for simplicity.

Table **60** is formed on its front surface with a partially female-threaded projection **70** in an axial bore of which a clamp pin **69** and a partially threaded and knobbed plug **68** are inserted for clamping the turn table to its occasionally selected rotary position.

A pair of support bars **75** and **75***a* are fixedly attached by their respective root ends to the table and mount in turn rotatable return rollers **76** and **76***a*, respectively. This stock return means is not necessarily provided when a plurality of these machines are arranged on line for machining the stocks in a continuous and successive way in order to subject them to successive and different planing degrees.

At the right-hand end of table **60**, a scale member **78** is fixedly attached and a pair of guide dogs **79** and **79***a* are slidably mounted on the member. These dogs are selectively positioned by manual adjustment thereof along the member **78** and once in position can be fixed by tightening their fixing screws **77** and **77***a*, respectively. Wood stock as at **100** shown by imaginary line in FIGS. **1** and **2** is guided slidingly between these dogs.

The operation of the planer machine so far shown and described is as follows:

At first, the tension in the stock feed belt **31** is properly adjusted for suitable drive of the pressurizing and guiding rollers **13**.

Next, the upper movable assembly comprising the units **5**, **6** and **7** is lowered by turning the wheel **40** in one direction, until the belt **29** is brought into contact with the upper surface of unit **2**.

Then, the adjusting screws **17** for all the rollers **13** are manipulated to provide a certain predetermined spring pressure upon bearing blocks **15**. The lower adjusting screws **16** are adjusted so as to maintain the axes of all the rollers **13** in a common horizontal plane parallel to the upper surface of the unit **2**.

Next, the said upper assembly is elevated to a certain predetermined effective height measured from the upper surface of the unit **2**, said effective height being equal to the finished thickness of the wood stock as at **100**.

Next, rotate the turn table **62** to a desired rotary position thereof, where the cutting straight edge of the cutting knife establishes preferably a certain inclined angle, such as60°, relative to the travelling direction of the stock on the table **60**. Then, fix the thus set position of the turn table by manipulation of a fixing lever **107** (FIGS. **1** and **7**).

Next, turn main switch **108** appearing in FIGS. **1** and **6** on, so as to feed power from commercial current source, not shown, to motor unit **7**. In this way, drive roll **29** is brought into rotation, thereby stock feed belt **31** and feed rollers **13** being also brought into rotation.

At this stage, the stock **100** is fed from a certain conveyor means, or a preceding similar machine, not shown, between the guide dogs **79** and **79***a*, which are properly adjusted in their position along scale **78**, and until the stock **100** is caught between the belt **31** and the table **60**.

In this way, the newly fed stock **100** engages the belt **31** in a manner which carries the stock from left to right in FIGS. **1**, **3**, **4**, **5**, **6**, **7**, **8** and **9** and under pressure. If a certain undesirable projection such as a knot is present on either upper or lower surface of the stock, the upper assembly will become raised correspondingly and resiliently against the action of suspension spring **52**. Upon passage of the projection from contact with the belt **31** or the upper surface of table **60**, said assembly will be lowered automatically by own weight thereof by virtue of its suspension through the screwed shaft or rod **44**.

During passage of the stock in sliding contact with the cutting tool unit **64**, a predetermined cut is made on the lower surface of the stock and the thus formed shavings will be discharged below through a downwardly enlarged discharge passage appearing at the center of FIG. **9** into an accumulating space, not shown, formed in the interior space of the box-shaped machine bed **1**, so that a neat and sanitary cutting job is assured. The elastic and precisely guided suspension of the upper assembly from the uppermost unit **4** will assure a high precision cutting job. The weight balance of the motor and reduction gearing assembly **7** and the stock-pressurizing and feeding unit **6** relative to the slide **5** will enhance the preciseness of the cutting job still further. The combination of the elongated belt **31** with a series of pressure rollers **13** assures naturally a precise cutting over a wide surface area to be finished.

When it is desired to process a large series of stocks in a gang series of similar planer machines in a continuous and mass productive order, these machines can be arrange in line in such a way that all the surfaces of the units **2** of the machines are positioned on a common horizontal plane. With such arrangement, a continuous and high precision work can be assured in a high speed production.

The embodiments of the invention in which an exclusive property or privilege is claimed are as follows:

1. A carpenter planer, comprising a stationary, yet angularly adjustable cutter, a turn table mounting said cutter, a stock-guide table on which a wood stock is fed in sliding contact therewith, and a pressure feed unit adapted for pressure contact with said stock and for feeding said stock on said table, said planer being

characterized by that a lower assembly comprising said cutter, said turn table and said stock-guide table is mounted stationary during planer operation of the machine, and an upper assembly comprising the pressure feed unit and an independent electric motor mechanically connected therewith is kept in an elastically suspended position relative to said lower assembly.

2. A carpenter planer as set forth in claim 1, characterized by that said pressure feed unit and said electric motor are arranged in a weight-balancing relationship relative to a slide which is arranged slidable along stationary pillars extending uprightly from said lower unit.

3. A carpenter planer as claimed in claim 1, characterized by that said pressure feed unit comprises an endless belt driven from said motor and a plurality of stock feed rollers arranged parallel to each other and kept in driving contact with said belt.

4. A carpenter planer as set forth in claim 1, characterized by that said suspension is made through a rotatable upright shaft.

* * * * *