No. 887,021. PATENTED MAY 5, 1908.

J. R. THOMAS.

PLANING MACHINE.

APPLICATION FILED SEPT. 5, 1905.

4 SHEETS—SHEET 1.

Fig. 1.

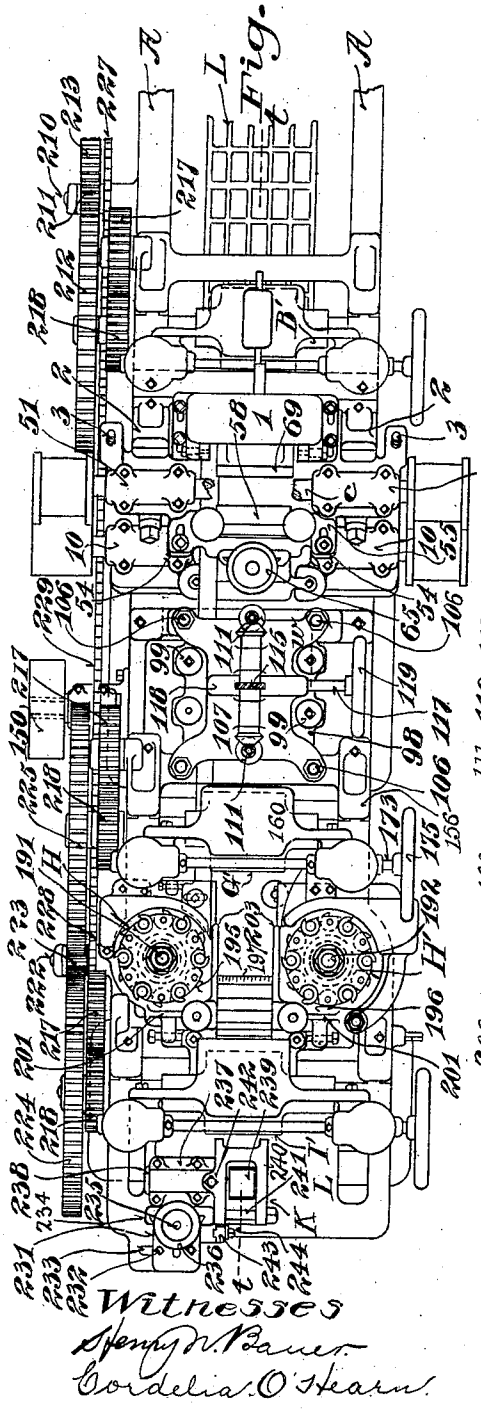
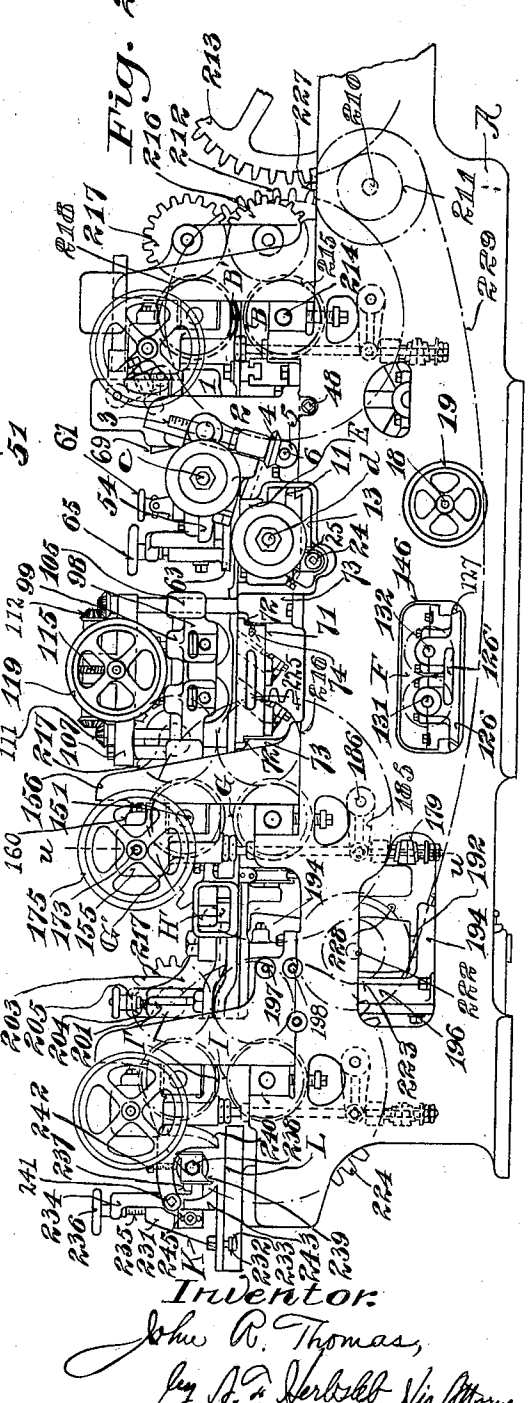


Fig. 2.



Witnesses
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Cordelia O'Hearn

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John R. Thomas,
by A. G. Herbold, His Attorney.

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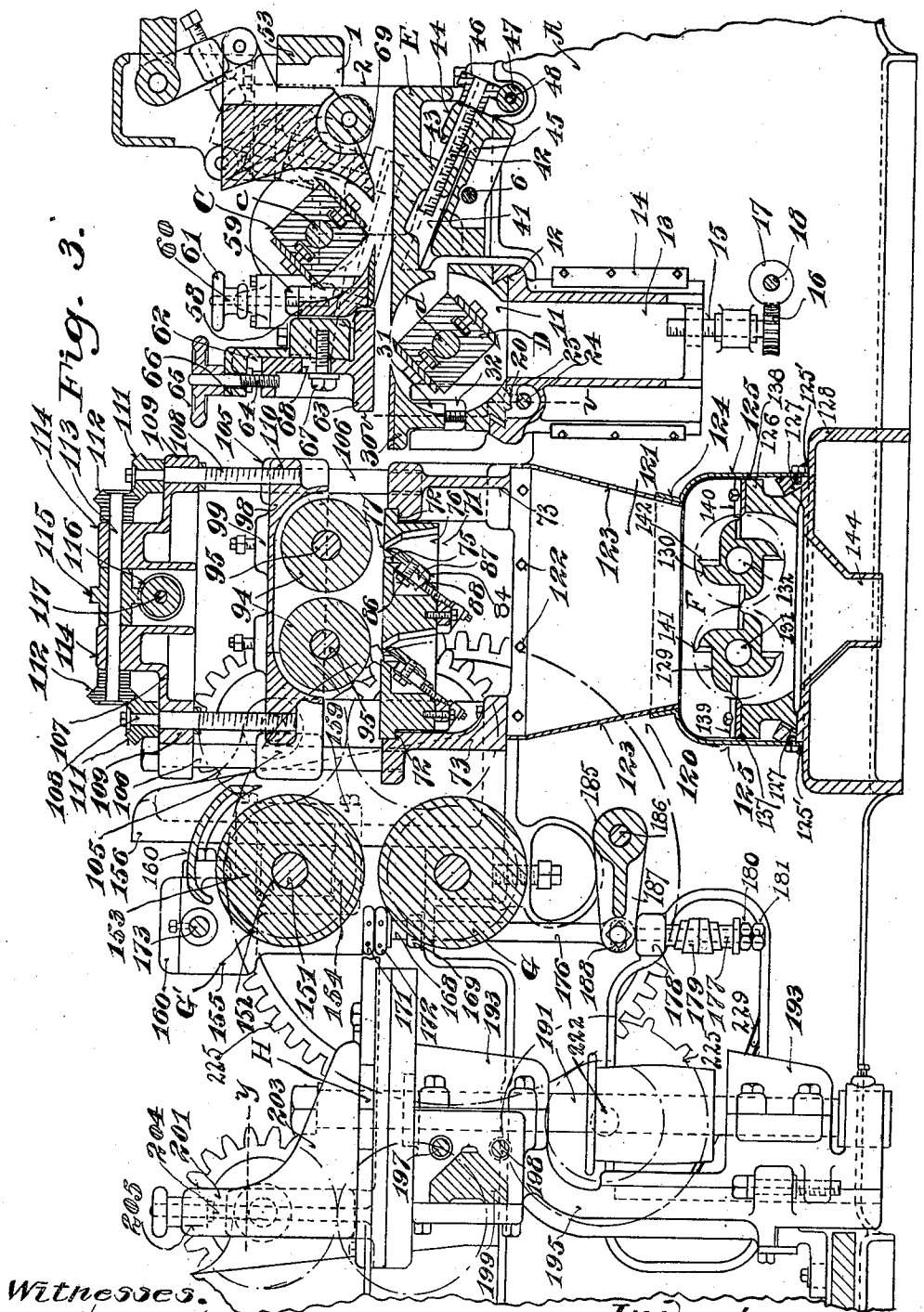
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4 SHEETS—SHEET 2.

Fig. 3.



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4 SHEETS—SHEET 3.

Fig. 4.

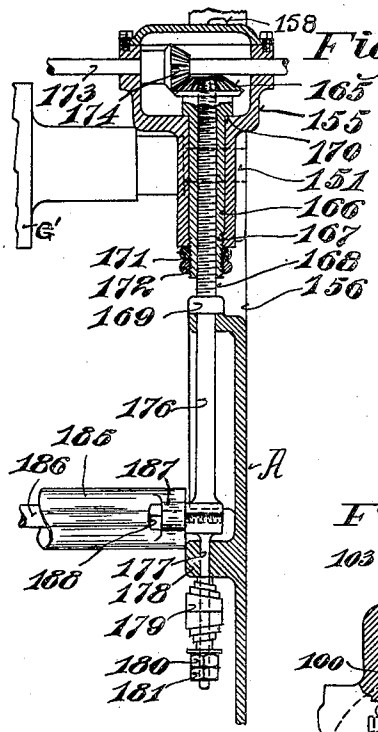
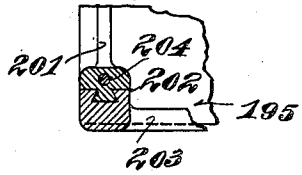


Fig. 15.



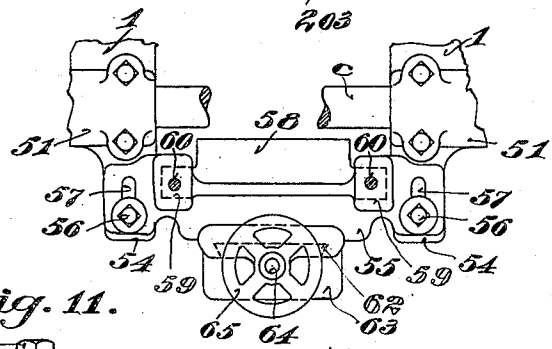


Fig. 7.

Fig. 11.

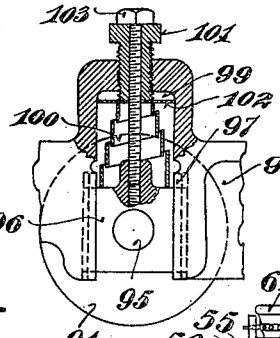


Fig. 8.

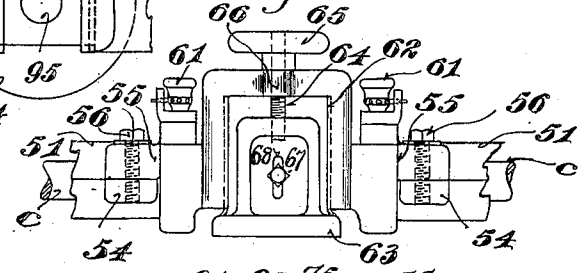


Fig. 5.

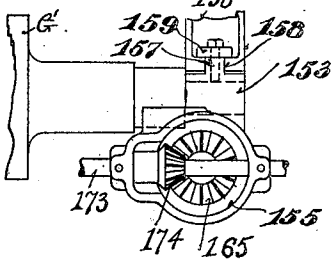
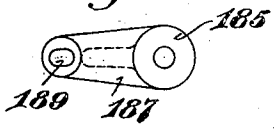


Fig. 6.



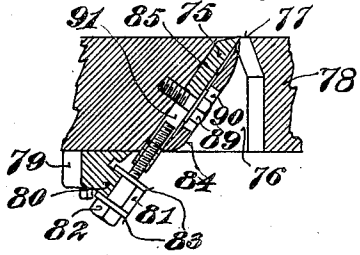


Fig. 16.

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No. 887,021. PATENTED MAY 5, 1908.

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PLANING MACHINE.

APPLICATION FILED SEPT. 5, 1905.

4 SHEETS—SHEET 4.

Fig. 9.

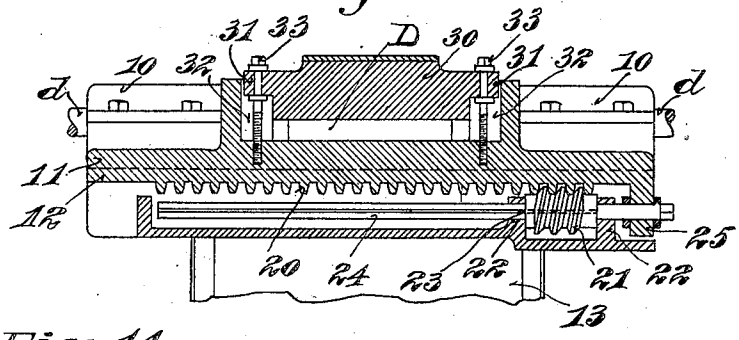
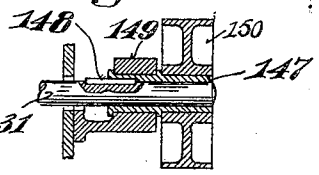


Fig. 14.



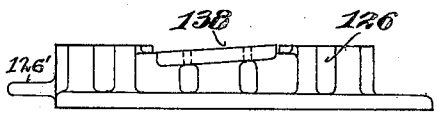


Fig. 12.

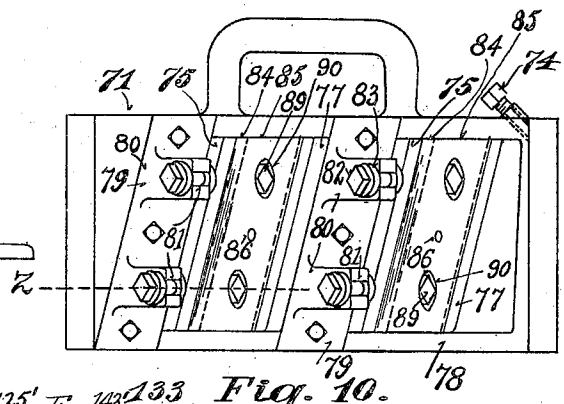


Fig. 10.

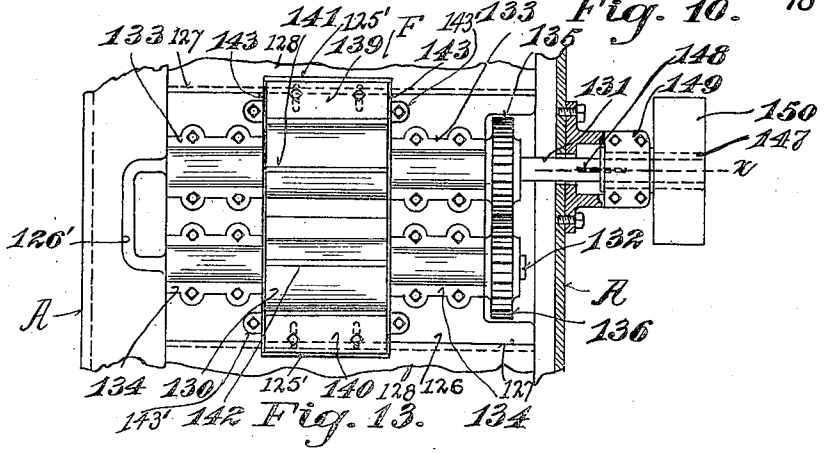


Fig. 13.

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UNITED STATES PATENT OFFICE.

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PLANING-MACHINE.

No. 887,021. Specification of Letters Patent. Patented May 5, 1908.

Application filed September 5, 1905. Serial No. 277,060.

To all whom it may concern:

Be it known that I, JOHN R. THOMAS, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Planing-Machines, of which the following is a specification.

My present invention is an improvement upon the planing machine shown, described and claimed in Patent No. 686,428, granted November 12, 1901, and applied for by me under date of March 5, 1900.

It is the object of my present invention to so divide and relatively arrange the cutting and feeding agencies as to relieve the stock of undue strain, and to provide other improvements in a machine of the character described, and the invention consists in the various instrumentalities and parts, and the combinations and arrangements of the same hereinafter more fully described and claimed.

In the drawings: Figure 1 is a plan view of my improved device with its feed-end broken away and having its upper cutter-head also broken away for better illustration of parts. Fig. 2 is a side elevation of the same. Fig. 3 is a central longitudinal section on the line *t*—*t* of Fig. 1, and with the feed-in and the feed-out ends of the machine broken away. Fig. 4 is a detail in vertical cross-section on the line *u*—*u* of Fig. 2 showing the roll-tension and adjusting means at one side of the machine. Fig. 5 is a plan view of the same with the gear-cover removed. Fig. 6 is an end view of the equalizer-lever for the upper yielding feed-roll. Fig. 7 is a plan view detail showing the mounting for the pressure-plate above the lower rotary cutter-head on the upper cutter-head housing partly broken away. Fig. 8 is a rear view of the same. Fig. 9 is a cross section on the line *v*—*v* of Fig. 3, showing the manner of shifting the lower rotary cutter-head yoke, and of mounting the pressure-foot after the cut of the lower rotary cutter-head. Fig. 10 is a bottom view of the fixed-knife cutter-box. Fig. 11 is a detail, partly in vertical section on the line *w* of Fig. 1, showing the pressure-mounting for the fixed-knife pressure-roll. Fig. 12 is a front view of the chopper frame. Fig. 13 is a plan view of the fixed-knife shavings-chopper with its hood-piece removed. Fig. 14 is a detail of the chopper-drive in section on the line *x* of Fig. 13. Fig. 15 is a detail in section on the line *y* of Fig. 3 showing the manner of mounting the pressure-plate on the side-head hanger; and, Fig. 16 is a detail of the fixed-knife box in section on the line *z* of Fig. 10.

A represents the main frame, at the feed-in end of which I mount one or more pairs of feeding-in rolls, one pair of which is shown at B B′ and which may be driven in suitable manner.

C is an upper horizontally disposed rotary cutter-head mounted on a housing 1 which is given adjustment on standards 2 2 by means of screw-rods 3 at the respective sides of the machine, said screw-rods being operated by bevel-gears 4 5 from a cross-shaft 6.

A lower horizontally disposed rotary cutter-head D is mounted on a shaft *d* in bearings 10 on a yoke 11 slidable in ways 12 extending transversely of a saddle 13 which is vertically adjustable at both sides of the main frame simultaneously in guide-ways 14 on the frame by means of a screw-rod 15 at each side of the machine operated by spiral-gears 16 17 from a cross-shaft 18 having a hand-wheel 19, the cross-shaft and screw-rods being journaled on the frame, the screw-rod taking into threaded apertures in the saddle. The yoke 11 is given longitudinal movement on the saddle by being provided with a rack 20, into which a worm-pinion 21 meshes, the worm-pinion being journaled between bearings 22 in the saddle and having spline-connections 23 with and operated by operating-shaft 24 journaled and held against endwise movement in a lug 25 of the yoke 11. The rack 20 preferably stops short of the length of the yoke. This construction permits longitudinal movement of the yoke for exposure and attention of the knives of the lower rotary cutter-head or removal of the yoke with its cutter-head from the frame.

A pressure-foot 30 after the cut of the lower rotary cutter-head has side-lugs 31 fitted into recesses 32 of the yoke and is vertically adjustable therein by being mounted upon bolts 33 journaled on the pressure-foot and threaded into the yoke.

A feeding-in table E is under the upper rotary cutter-head in advance to the lower rotary cutter-head and is at each side mounted in an inclined guide-way 41 in which it is given adjustment by threaded rod 42 threading into a lug 43 on the feeding-in table-frame and journaled against endwise movement in a lug 44 on a cross-girth 45 of the

main frame. A spiral gear 46 on the threaded rod 42 meshes with a spiral gear 47 on an operating shaft 48. The guide-ways are preferably on the standards 2.

The upper cutter-head shaft *c* is mounted in bearings 51 of the upper cutter-head-housing 1 having a connecting web 53 at its front. The housing is provided with rearwardly extending shelves 54 at the respective sides thereof upon which a bridge 55 is adjustably secured as by having bolts 56 pass through slots 57 in the bridge and into threaded apertures in said shelves. A pressure-foot 58 after the cut of the upper rotary cutter-head has its ends mounted in recesses 59 in this bridge and is adjustable vertically by means of screw-rods 60 having hand-wheels 61 journaled in the bridge and threaded into threaded apertures in said pressure-foot. The bridge also has a guide-way 62 in which a pressure-plate 63 for the lower rotary cutter-head slides and is adjusted by means of a screw-rod 64 having hand-wheel 65 journaled on a lug 66 of said bridge and threaded into a threaded aperture in said pressure-plate. A bolt 67 takes through a slot 68 in said pressure-plate and into said bridge for securing the pressure-plate rigidly in position after adjustment. A chip-breaker 69 for the upper rotary cutter-head is suitably mounted and adjustable on the upper cutter-head housing, proper tension mechanism for pressing it upon the stock being also provided for it.

Mounting the said pressure-plate and the pressure-foot after the cut of the upper rotary cutter-head upon said bridge, which in turn is adjustably secured to the upper rotary cutter-head housing, the chip-breaker for the upper rotary cutter-head being also mounted on said housing, permits the said pressure-plate, pressure-foot and chip-breaker to be supported in close relation compactly upon the upper rotary cutter-head housing so as to move therewith and independently thereof, and the construction and relative arrangement of said parts and of the upper and lower horizontally disposed rotary cutter-heads and of the feeding-in table for the lower rotary cutter-head under the upper rotary cutter-head, permits the upper and lower horizontally disposed rotary cutter-heads to be brought closely adjacent to each other and to the fixed-knife devices for the stock.

After the stock has passed the horizontally disposed rotary cutter-heads it is operated on by the horizontally disposed fixed-knife cutting devices which will now be described.

71 is a fixed-knife cutter-box resting and slidable in way 72 of the cross-girths 73 and suitably secured in position by a bolt 74 threaded diagonally in the fixed-knife box and taking against one of said cross-girths. The fixed knives are shown at 75 and extend diagonally of the machine for imparting a shear cut to the stock, and are located in recesses 76 in said box, their cutting edges taking through diagonal openings 77 in the upper face of said box.

The frame 78 (see Fig. 16) of the fixed-knife box has diagonal braces 79 bolted to its bottom. These braces have lugs 80 having slots 81. Set screws 82 take into these slots and have collars 83 at either end of said lugs to prevent longitudinal movement of the set-bolts. The set-bolts are threaded into the lower ends of the fixed-knives for positioning the knives in the box. A knife-cap 84, whose back is hollowed longitudinally as shown at 85, takes over each fixed-knife and is held thereto by a set-screw 86 (see Fig. 3) taking through a slot 87 in the fixed-knife, the head of said set-screw resting in a recess 88 in the box. Bolts 89 (see Fig. 16) take into apertures 90 in said cap and through slots 91 in the fixed-knife and into the box for securing the fixed-knife and cap in the box.

The pressure means above the fixed-knives preferably consist of rolls 94, (see Figs. 1, 2, 3 and 11) whose rotary axes extend at right angles to the length of the machine and are vertically above the middle of the cutting edges of the fixed-knives (see Fig. 3) for distributing the bearing-pressure of said rolls equally to either side of said middle of the knives. In this manner the vertical plane of the rotary axis of the pressure-roll intersects the vertical plane of the cutting-edge of the fixed-knife at the longitudinal middle of said cutting edge, so that the effective pressure of the roll, which roll extends across the fixed-knife box, from side to side of the latter, at right angles to the length of the machine, is distributed across the board being planed in such relation to the knife that the knife will cut evenly at all points transversely of the board, for in planing with a fixed-knife I find that the middle of the board requires the most pressure at the knife-edge while the side edges of the board are capable of being held down with slightly less pressure, and therefore placing the fixed-knife and pressure-roll relatively as stated, brings about the desired result in simplest manner, and is especially effective in planing hard wood. The shafts 95 of said rolls are at each end mounted in bearing-blocks 96 slidable in guide-ways 97 of a roll-frame 98. The roll-frame has pockets 99 in which springs 100 are located, the springs bearing against the bearing-blocks. Hollow bolts 101 are threaded into the upper walls of the pockets 99 and bear against washers 102 which in turn take against the upper ends of the springs for adjusting the tension of the latter. Bolts 103 are theaded into the bearing-blocks and take through the hollow bolts and have their heads rest on said hollow bolts for limiting

the downward movement of said bearing-blocks and thereby limiting the downward movement of the pressure-rolls 95. The springs 100 are preferably volute leaf springs which bear with great pressure upon the bearing-blocks for firmly pressing the stock against the fixed knives and permitting the rolls to yield only against pressure to prevent damage to the stock or machine. The roll-frame has a bearing 105 at each corner taking about a rod 106, the rods being secured to the cross-girths 73. At their tops these rods are connected by a spider 107. Screw-rods 108 are journaled in lugs 109 on this spider and take into internally threaded apertures 110 in the roll-frame 98, said respective screw-rods having bevel gears 111 which mesh with bevel gears 112 on a shaft 113 journaled in bearings 114 in the spider and having a spiral gear 115 thereon which meshes with a spiral gear 116 on an operating shaft 117 journaled in bearings 118 on the spider and having hand-wheel 119 for operating the same.

The shavings made by the fixed knives pass from the same in long strips and their removal has heretofore been inconvenient owing to their clogging tendencies, these long shavings also having a tendency to twist about in and choke up the pipes of a blower system when such system was used in connection with the planing machinery. For readily removing the same and preventing their clogging, I provide a chamber 120 under the fixed knives, formed for instance of side plates 121 whose upper ends are connected with the side-frame of the machine by bolts 122 and have connecting plate 123 at front and rear for forming the chamber in the form of a hopper whose lower end takes into a mouth 124 of a hood-piece 125 secured in rabbets 125′ of cross-girth 128. At the bottom of the chamber, I provide a shavings-chopper F, adapted to divide the long shavings into short pieces, and I do this latter in peculiar manner. (See Figs. 2, 3, 12 and 13).

126 is a chopper-frame which is supported in guide-ways 127 on cross-girth 128 of the frame, which cross-girth preferably forms a funnel-piece having a funnel-mouth 144 connecting with a suitable blower-system.

Chopper-heads 129 130 are respectively mounted on shafts 131 132 journaled respectively in bearings 133 134 of the chopper-frame. Gears 135 136 are secured to said respective shafts and mesh with each other, rotating said shafts in opposite directions and moving the inner faces of said chopper-heads upwardly away from each other. The frame 126 is provided with inclined supports 137 138 for receiving knives 139 140 adjustable thereon. The chopper-heads are provided with knives 141 142. The stationary chopper-knives 139 140 are outside the circles of swing of the chopper-heads. The knives of the chopper-heads swing downwardly at the outer parts of their circles of swing closely adjacent to the stationary chopper-knives, which latter, being inclined relatively to the rotating chopper-knives, cause the long shavings to be chopped into short pieces with a shear cut. By these means the stream of long shavings coming from the fixed-knife cutting devices is separated and the shavings are drawn toward the ends of the chopping-chamber and into engagement with the inclined stationary chopper-knives, thereby preventing their clogging and disintegrating or reducing the long shavings into short bits with a shear cut operating very rapidly with slight power. Adjacent the ends of the knives the chopper frame is provided with side-plate sections 143 which register with the lower ends of the side plates 121 of the shavings-chamber 120, the side-plate sections having securing flanges 143′ and being shifted with the chopper-frame through an opening 145 in the hood-piece.

For permitting the chopper-frame to be shifted or removed it is slidable transversely of the main frame upon the guide-ways 127, a handle 126′ being on the frame, the side-plate sections 143 moving with the chopper-frame through opening 146 in the main frame, and for permitting this longitudinal movement to be accomplished without disturbing the drive of the chopper-heads thereon, the shaft 131 is elongated and takes into a sleeve 147 (see Figs. 13 and 14) with a spline-connection 148, or clutch, the sleeve being journaled in a bearing 149 on the main frame, said sleeve carrying the pulley 150. As the chopper-frame is moved transversely, the shaft 131 slides out of the sleeve without disturbing the pulley. When the chopper-frame is replaced the shaft readily finds its seat in said sleeve.

Immediately following the horizontally disposed fixed-knife devices, I provide a pair of feeding-rolls G G′ adapted to take the stock direct from the said fixed-knife planing devices into engagement with side cutter-heads H H′, thereby relieving the stock, at its point of hitherto greatest strain from undue end strain and drawing the stock away from the fixed-knife cutting devices before it is subjected to the action of the said side cutter-heads and preventing undue buckling of the stock in advance of said fixed-knife cutting devices, and causing uniform feeding of the stock, and reducing the danger of breakage of stock in the machine to a minimum. The lower feed-roll may be given slight vertical adjustment in suitable manner. The upper feed-roll G′, has each end of its shaft 151 (see Figs. 2—6) mounted in a bearing 152, taking between the wings 153 154 of a gear-box 155, slidable on a standard 156 by

having tongues 157 of said wings take into a slot 158 of said standard, to which tongues a retaining-piece 159 is secured, the retaining-piece taking against the rear of the walls of said slot. The gear-boxes at the respective ends of the roll are connected by a roll-cover 160 for forming a roll-housing. A bevel-gear 165 is journaled in each of said gear-boxes and has an elongated hub 166 internally threaded as shown at 167 for receiving a threaded rod 168 which has a collar 169 thereon for normally resting on the machine frame. The bevel gear 165 is held against endwise movement by being shouldered upon the gear-box as shown at 170 and having nuts 171 172 take about its hub, the nut 171 taking against the gear-box. A cross-shaft 173 is journaled in said gear-boxes, and in the gear-box at each end thereof it has a bevel-gear 174 meshing with the bevel-gear 165, a hand-wheel 175 operating the cross-shaft. Each of the threaded rods 168 has a lower extension 176 and a sub-extension 177, which latter takes through a lug 178 on the main frame. A spring 179 takes about each of said sub-extensions and bears against said lug, nuts 180 181 being provided for regulating the tension of the spring. An equalizing lever 185 extends across the machine on a rod 186 and has an arm 187 at each end. Each of these arms has articulated connection with one of said lower extensions, as by having a bolt 188 take through a slot 189 in said arm and into said lower extension. The equalizing lever equalizes the lift at both ends of the upper yielding feed-roll so as to provide uniform lift throughout the length of said feed-roll upon lifting pressure being exerted against any part of said feed-roll.

The side cutter-heads H H′ are respectively mounted on spindles 191 192 journaled respectively in bearings 193 194 on hangers 195 196 adjustable laterally of the machine by screw-rods 197 198, the side-hangers being mounted on a cross-rod 199.

An extension 201 projects upwardly from each of the hangers 195 196 and moves therewith, and has a guideway 202 (see Fig. 15) for receiving a pressure-plate 203 adjustable in said guide-way by means of a screw-rod 204 journaled in a lug 205 of the pressure-plate and threaded into said extension. These pressure-plates are very thin and extend vertically and longitudinally of the machine toward the fixed-knife planing devices and take against the sides only of the stock immediately adjacent the cutting points of the side-heads, reducing the transverse surface and consequent frictional resistance of their contact with the stock passing thereunder to the minimum and permitting the side-head hangers to be adjusted to positions closely adjacent each other. Immediately following the said side cutter-heads there is a pair of feed rolls I I′ similar in construction and manner of mounting to the feed-rollers G G′ and B B′. These feed rollers may be driven in the following manner: 210 is a driving shaft which may be driven in suitable manner from a suitable countershaft. On it there is a pinion 211 meshing with gears 212 213. The gear 212 is mounted on the shaft 214 of feed-roll B, and the gear 213 is mounted on a shaft on the lower feed-roll of an additional pair of feed-rolls in advance of the feed-rolls B B′ if such feed-rolls are desired. A gear 215 is also mounted on the shaft 214 and through gears 216 217 operates gear 218 mounted on the upper feed-roll shaft. The feed-rolls G G′ and I I′ may be driven from a shaft 222 journaled in the main frame, on which there is a pinion 223 meshing with gears 224 225 respectively on the shafts of the rolls I and G. The rolls of the several pairs of feed-rolls may have gear-connections similar to the rolls G G′, the parts being indicated by similar letters in the drawings. A sprocket-wheel 227 is also mounted on the shaft 210 and drives a sprocket-wheel 228 mounted on the driving shaft 222 by means of sprocket-chain 229 passing thereover. Immediately following the feed-rolls I I′, there is a backing-out device K having for its purpose the hollowing out of the back of the stock, that is, providing the back of the stock with a longitudinal groove. This backing-out device comprises a standard 231 adjustable transversely of the bed L by means of T-bolts 232 taking through the standards and into T-slots 233 in the bed. A slide 234 is adjustable vertically on the standard by means of screw-rod 235 having hand-wheel 236. This slide has a bearing 237 for shaft 238, carrying backing-out cutter-head 239. A chip-breaker 240 is pivoted to the slide on a rod 241, a bolt 242 adjustable on the chip-breaker taking against the bearing 237 for limiting its downward movement. A pressure-foot 243 after the cut of the backing-out cutter-head is vertically adjustable on the standard by having a bolt 244 taking into the standard through a slot 245 in the pressure-foot.

It will be noted that in my improved device I reduce the stock to uniform thickness by horizontally disposed rotary cutter-heads at the feeding-in end of the machine located in vertical planes very closely adjacent to each other, from which the stock passes directly to very closely adjacent fixed-knife cutting devices, from which latter the stock is drawn by feeding-rolls closely adjacent to the fixed-knife cutting devices into closely adjacent side cutter-heads, from which they are again drawn by closely adjacent feeding-rolls into the closely adjacent backing-out device, the feeding rolls being so divided among the cutting agencies that the stock is at no time subjected to undue end strain, thereby minimizing the danger of the break-

age of stock in the machine, and providing a machine of great feeding capacity and capable of great output.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a fixed-knife planing machine, the combination with a fixed-knife planing device, of a casing thereunder, and a shavings-chopper at the lower end of said casing, said shavings-chopper comprising a slidable frame, stationary chopper-knives thereon, rotary chopper-heads journaled on said frame between said stationary chopper-knives, means for rotating said chopper-heads with their upper parts rotating away from each other toward said stationary chopper-knives whereby the shavings in said casing are separated prior to being chopped, the rotary axes of said chopper-heads being in substantially horizontal planes and said stationary chopper-knives being inclined with relation to the latter, the said casing having side walls, and side-wall sections secured to and movable with said slidable frame and normally registering with said side walls, substantially as described.

2. In a fixed-knife planing-machine, the combination with the fixed-knife planing device, of a casing thereunder, and a shavings-chopper at the lower end of said casing, said shavings-chopper comprising a slidable frame, stationary chopper-knives thereon, and rotary chopper-heads journaled in said casing between said stationary chopper-knives, and means for rotating said chopper-heads with their upper parts rotating away from each other toward said stationary chopper-knives whereby the shavings in said casing are separated prior to being chopped, the rotary axes of said chopper-heads and said stationary chopper-knives being relatively inclined, substantially as described.

3. In a fixed-knife planing machine, the combination with a fixed-knife cutting device, of a shavings-chopper thereunder comprising a chopper-frame, rotary chopper-heads journaled therein, stationary chopper blades at the sides of the latter, a shaft for a rotary chopper-head, driving means between said rotary chopper-heads for rotating said chopper-heads with their upper parts rotating away from each other toward said stationary chopper-knives whereby the shavings coming from said fixed-knife cutting device are separated prior to being chopped, a main frame, a bearing thereon, a sleeve journaled in said bearing in longitudinal plane with said shaft, a driving device on said sleeve, and a clutch between said shaft and sleeve for permitting removal of said chopper-frame without removal of said driving device, substantially as described.

4. In a fixed-knife planing-machine, the combination with the main frame and fixed-knife cutter-box and spider, rods between said spider and the main frame at each corner of said spider for rigidly securing said spider to said main frame, a pressure-roll frame, a bearing at each corner thereof taking about said respective rods, pressure-rolls in said frame above the fixed knives of said fixed-knife cutter-box, a shaft for each, a bearing at each end of each of said shafts, an independent spring for each of said bearings, pressing said respective rolls downwardly independently at each end of each of said rolls, and adjusting screws between said spider and pressure-roll frame journaled against endwise movement to one of said parts and having threaded connection with the other of said parts for adjusting and rigidly positioning said pressure-roll frame, substantially as described.

5. In a fixed-knife planing machine, the combination with a fixed-knife planing device, of a shavings-chopper therefor comprising stationary chopper-blades and rotary chopper-heads whose cutting-edges rotate away from each other at the upper parts of said heads toward said stationary chopper-blades, whereby the stream of shavings is separated prior to being chopped.

6. In a fixed-knife planing machine, the combination with a fixed-knife box, of a fixed-knife and a hollowed cap therefor, said box having lugs provided with open-ended recesses, bolts turning and held endwise in said recesses and arranged to slip sidewardly therefrom, said fixed-knife being provided in its body with threaded apertures between the planes of its sides opening rearwardly and receiving the threaded ends of said bolts for adjusting said fixed-knife, bolts clamping said hollow cap to said fixed-knife, and other bolts securing said fixed-knife to said box, substantially as described.

In testimony whereof, I have signed my name hereto in the presence of two subscribing witnesses.

JOHN R. THOMAS.

Witnesses:
EMIL RITZ, Jr.,
WILLIAM S. WILLIAMS.