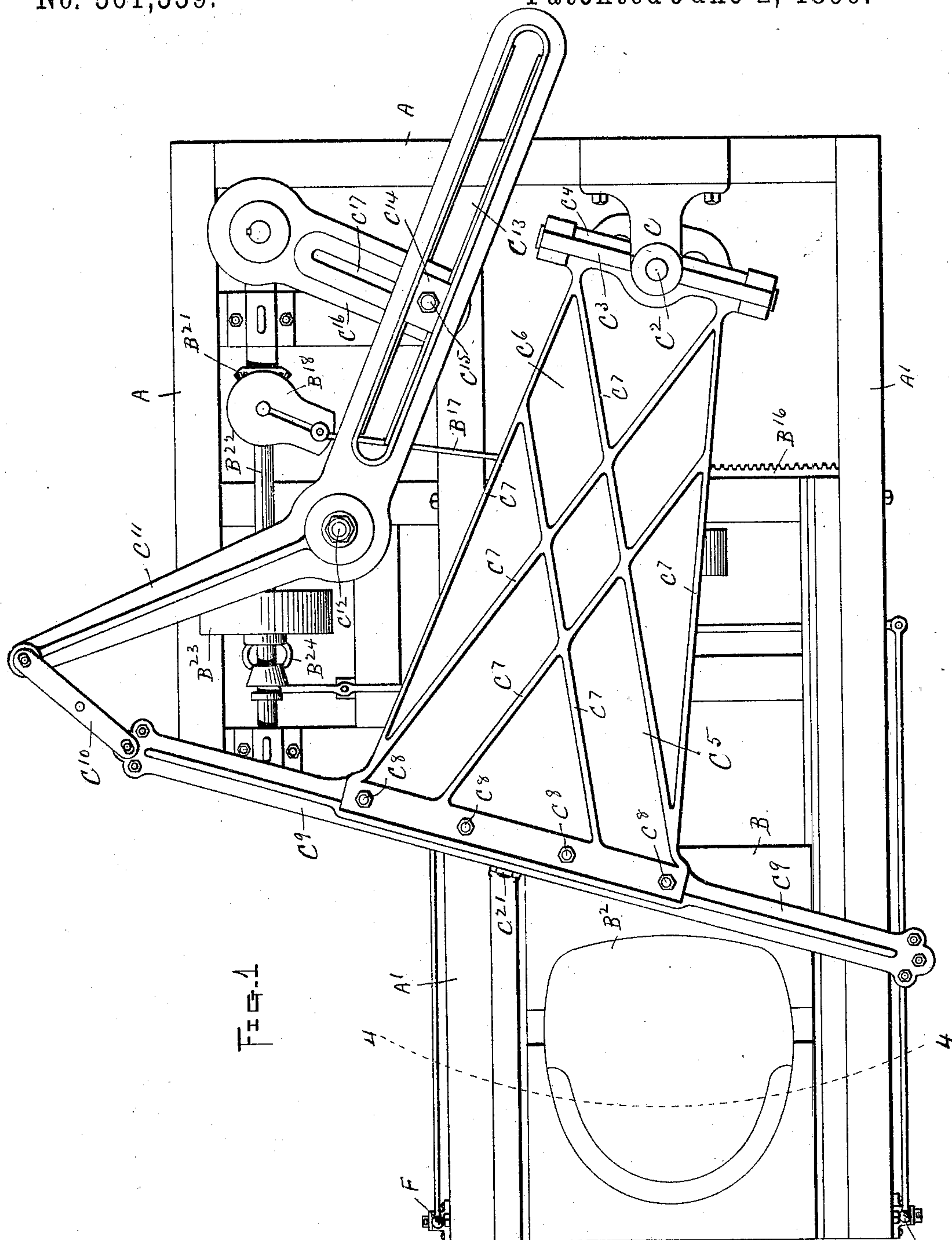


4 Sheets—Sheet 1.

# WOOD PLANING MACHINE FOR SHAPING WARPED OR IRREGULAR SURFACES.

Patented June 2, 1896.



Witnesses  
L. B. Tenny.  
Henry W. Parker.

Inventor  
Edward L. Taft  
By Rufus B. Fowler, his Atty

(No Model.)

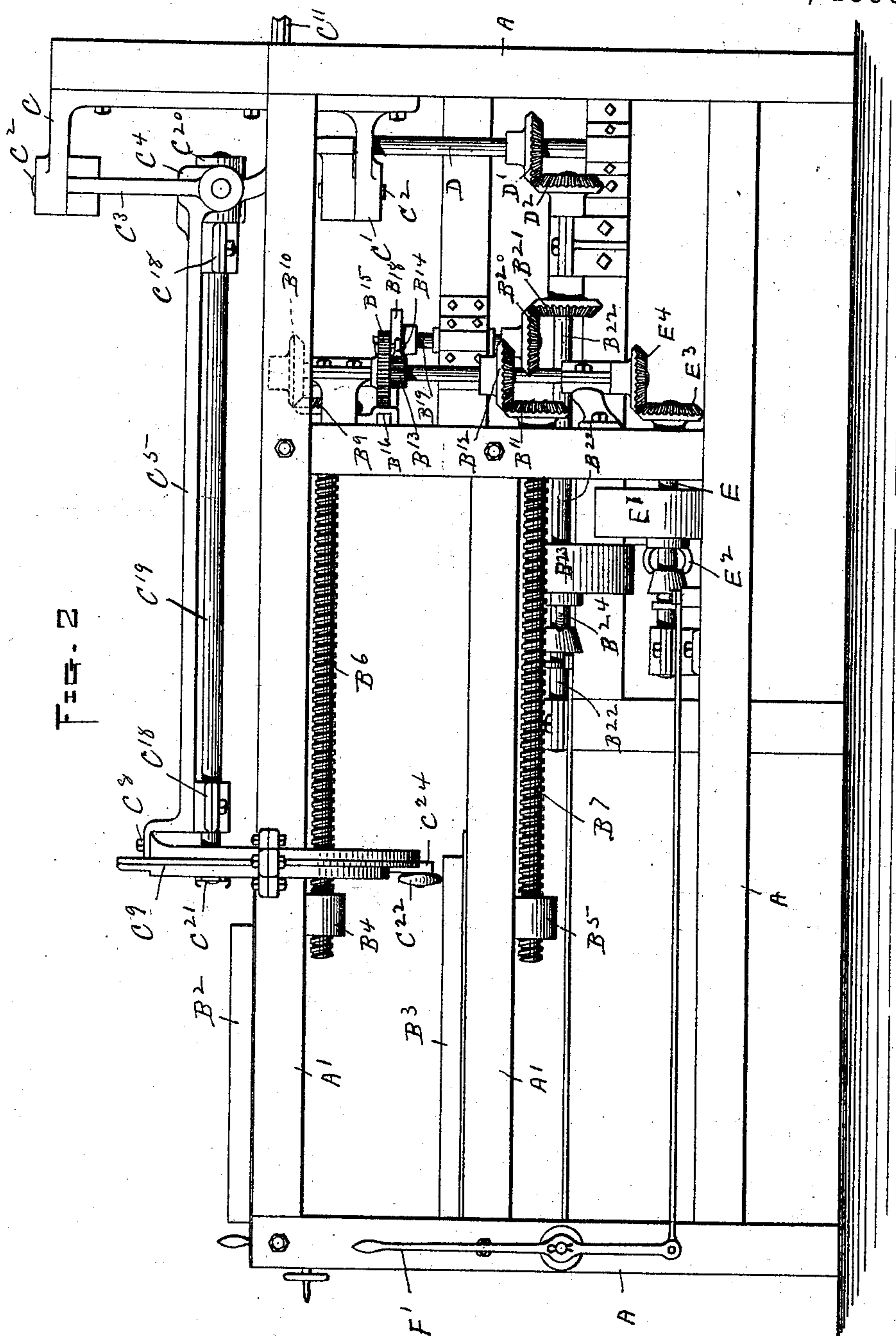
4 Sheets—Sheet 2.

E. L. TAFT.

WOOD PLANING MACHINE FOR SHAPING WARPED OR IRREGULAR SURFACES.

No. 561,359.

Patented June 2, 1896.



WITNESSES

L. B. Fenny

Henry W. Fowler

# Inventor

Edward L. Taft

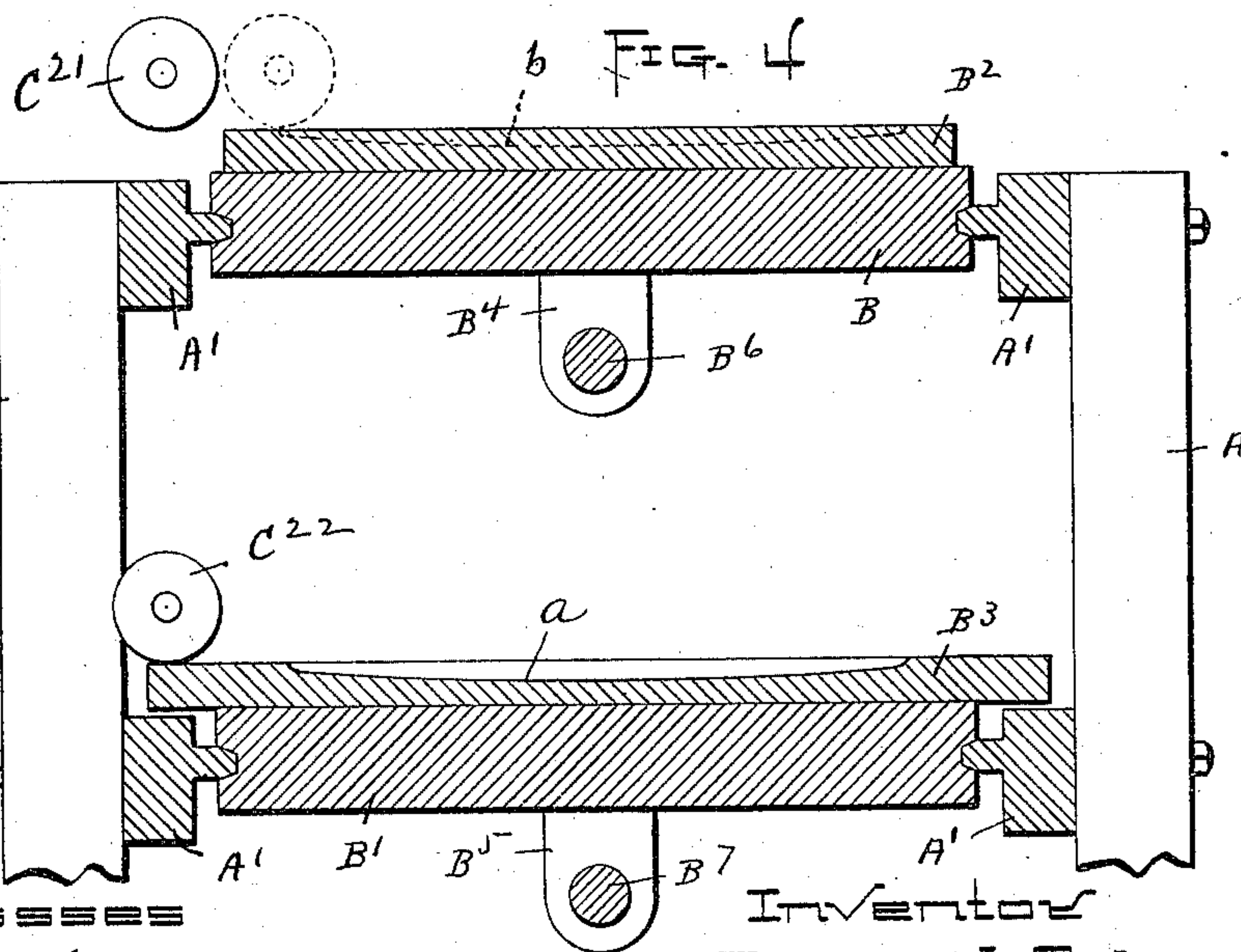
By Rufus B. Fowler, his Atty



4 Sheets—Sheet 3.

# WOOD PLANING MACHINE FOR SHAPING WARPED OR IRREGULAR SURFACES.

Patented June 2, 1896.



Inventor  
Edward L. Taft  
By Rufus B. Fowler, his Atty

(No Model.)

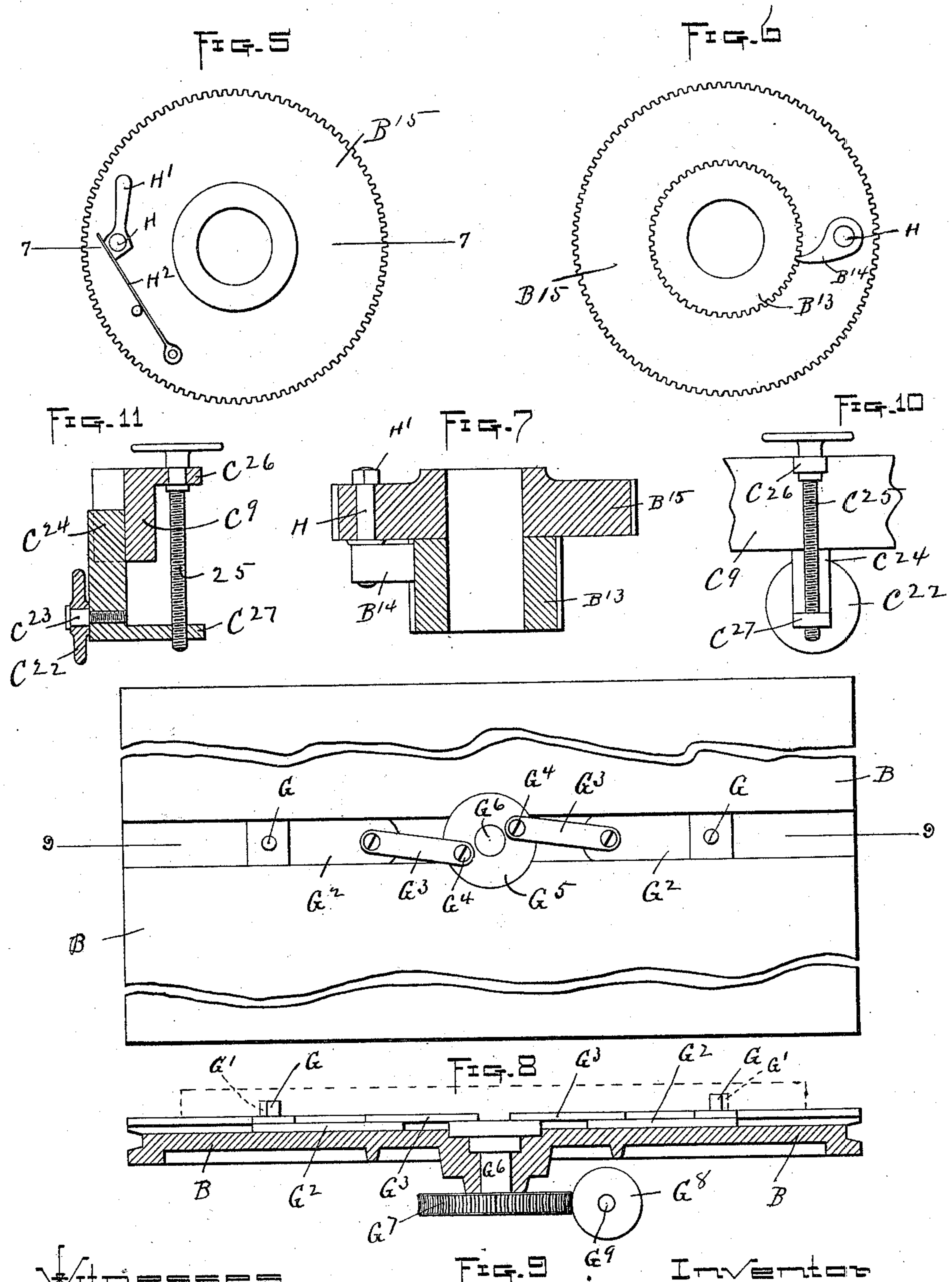
4 Sheets—Sheet 4.

E. L. TAFT.

WOOD PLANING MACHINE FOR SHAPING WARPED OR IRREGULAR SURFACES.

No. 561,359.

Patented June 2, 1896.



Witnesses  
L. B. Terry  
Henry W. Fowler

FIG. 8

Inventor  
Edward L. Taft  
By his Attorney  
Rufus J. Fowler



# UNITED STATES PATENT OFFICE.

EDWARD L. TAFT, OF GARDNER, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO JAMES L. CHAPMAN, OF WORCESTER, MASSACHUSETTS.

WOOD-PLANING MACHINE FOR SHAPING WARPED OR IRREGULAR SURFACES.

SPECIFICATION forming part of Letters Patent No. 561,359, dated June 2, 1896.

Application filed December 20, 1893. Serial No. 494,195. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD L. TAFT, a citizen of the United States, residing at Gardner, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Wood-Molding Machines for Forming Warped or Irregular Surfaces, of which the following is a specification, accompanied by drawings forming a part of the same, and in which—

Figure 1 represents a top view of a machine embodying my invention. Fig. 2 is a side view of the same. Fig. 3 is an end view. Fig. 4 is a transverse view of the two carriages upon which are supported the work to be planed and the pattern by which the vertical movement of the cutter-head is determined, the section being shown upon a line 4 4, Fig. 1, having the same curvature as the path of the cutter. Fig. 5 is a top view of the loose gear carrying the actuating-pawl, by which an intermittent motion is imparted to the feed-screws. Fig. 6 represents the under side of the same. Fig. 7 is a central sectional view of the same. Fig. 8 is a top view of the work-holding carriage, and Fig. 9 is a central sectional view of the same on line 9 9, Fig. 8. Fig. 10 is a rear view of the pattern-wheel and sliding plate, showing its actuating-screw; and Fig. 11 is a sectional view of Fig. 10.

Similar letters refer to similar parts in the different figures.

The object of my present invention is to provide a wood-planing machine by which the surface of the work can be planed so as to present a warped or irregular surface corresponding with the surface of a determined pattern.

The machine embodying my present invention is capable of being used for a great variety of woodwork requiring an irregular or warped surface, and in the accompanying drawings I have represented such a machine as adapted to form the irregular or varying upper surface of a wood chair-seat; and my invention consists in providing a cutter-head capable of traversing across the surface to be cut and having a rising and falling motion during its traversing movement across the work as determined by the shape of a set

pattern, and, further, in the construction and arrangement of the several parts by which this result is secured, as hereinafter described, and pointed out in the annexed claims.

Referring to the accompanying drawings, A denotes the framework of the machine, by which the operating parts are supported.

A' A' denote an upper and lower pair of horizontal rails supported by the framework and provided upon their inner sides with ways for two carriages or feed-tables B and B'. Upon the upper carriage B is attached the work to be planed, which in the accompanying drawings represents a wood plank or block B<sup>2</sup> from which a chair-seat is to be formed. Upon the lower carriage B' is fastened an iron plate B<sup>3</sup>, having its upper surface shaped to correspond with the desired form of the chair-seat. The carriages B and B' are provided upon their lower sides with lugs B<sup>4</sup> and B<sup>5</sup>, each having a screw-thread engaged by the rotating screws B<sup>6</sup> and B<sup>7</sup>, causing a feeding motion to be simultaneously imparted to the carriages B and B', so as to carry the work forward beneath a revolving cutter-head and at the same time carry the pattern B<sup>3</sup> forward beneath a pattern-wheel, which rolls over its surface.

The screws B<sup>6</sup> and B<sup>7</sup> are driven from a vertical shaft B<sup>8</sup> through intermediate miter-gears B<sup>9</sup> B<sup>10</sup> and B<sup>11</sup> B<sup>12</sup>. The vertical shaft B<sup>8</sup> has attached thereto a ratchet B<sup>13</sup>, which is engaged by a pawl B<sup>14</sup>, carried by the gear-wheel B<sup>15</sup>, which turns loosely upon the vertical shaft B<sup>8</sup> and receives an intermittent motion by means of a sliding rack B<sup>16</sup>, connected by a link B<sup>17</sup>, Fig. 1, with a crank-plate B<sup>18</sup> on a vertical shaft B<sup>19</sup>. The vertical shaft B<sup>19</sup> is driven by miter-gears B<sup>20</sup> and B<sup>21</sup> from the horizontal driving-shaft B<sup>22</sup>, which receives its motion through a belt-pulley B<sup>23</sup> and clutching mechanism B<sup>24</sup>.

Projecting from the frame are arms C C', each arm holding a stud C<sup>2</sup> C<sup>2</sup>, upon which is pivoted a circular frame C<sup>3</sup>. Pivoted upon a horizontal axis within the circular frame C<sup>3</sup> is a cross-bar C<sup>4</sup>, from one end of which extends a framework C<sup>5</sup>, consisting of a web and stiffening-ribs C<sup>6</sup> C<sup>7</sup>. The opposite end of the frame C<sup>5</sup> is attached by bolts C<sup>8</sup> to a



yoke C<sup>9</sup>, elliptical in form and connected at one end by a link C<sup>10</sup> with a vibrating lever C<sup>11</sup>, which turns upon a stud C<sup>12</sup> and is provided with a slot C<sup>13</sup>, in which slides a block C<sup>14</sup>, pivoted upon a stud C<sup>15</sup>. The stud C<sup>15</sup> is attached to a rotating crank-arm C<sup>16</sup>, which is provided with a slot C<sup>17</sup>, in order to allow a radial adjustment of the stud C<sup>15</sup> for the purpose of varying the angular movement of the vibrating lever C<sup>11</sup>. By the rotation of the crank-arm C<sup>16</sup> and the angular motion of the lever C<sup>11</sup> the yoke C<sup>9</sup> is swung back and forth upon the studs C<sup>2</sup> C<sup>2</sup>. Upon the under side of the framework C<sup>5</sup> are placed two journal-bearings C<sup>18</sup> C<sup>18</sup> to hold a revolving shaft C<sup>19</sup>, which is provided at one end with a belt-pulley C<sup>20</sup> and at the other end with a revolving cutter-head C<sup>21</sup>, which is carried back and forth over the surface of the chair-seat by the traversing movement of the yoke C<sup>9</sup>. The lower portion of the yoke C<sup>9</sup> carries a pattern-wheel C<sup>22</sup>, having its diameter corresponding to the diameter of the cutter-head C<sup>21</sup> and turning upon a stud C<sup>23</sup>, which is carried upon a plate C<sup>24</sup>, sliding in ways formed in the yoke and actuated by a screw C<sup>25</sup>, so that the vertical position of the pattern-wheel C<sup>22</sup> in the yoke C<sup>9</sup> can be slightly varied.

The crank-arm C<sup>16</sup> is carried upon the upper end of a vertical shaft D, driven from the horizontal driving-shaft B<sup>22</sup> through the miter-gears D<sup>1</sup> and D<sup>2</sup>. The reverse movement of the carriages B and B' is accomplished by a horizontal shaft E, journaled in bearings supported by the framework and driven by means of the belt-pulley E' and clutching mechanism E<sup>2</sup>. Upon the end of the horizontal shaft E is a bevel-gear E<sup>3</sup>, engaging the bevel-gear E<sup>4</sup> upon the vertical-shaft B<sup>8</sup>, the motion of the horizontal shaft E serving to reverse the motion of the feed-screws B<sup>6</sup> and B<sup>7</sup> and produce a quick return of the carriages B and B' by disengaging the pawls B<sup>14</sup> from the ratchet B<sup>13</sup>. The clutching devices E<sup>2</sup> and B<sup>24</sup> are operated by means of the hand-levers F and F'.

The pattern B<sup>3</sup> consists of an iron plate which is attached to the lower carriage B', the upper surface of the plate corresponding to the shape of the surface to be formed upon the plank or block B<sup>2</sup>. The plank or block B<sup>2</sup> is attached to the upper carriage B by means of pins G, adapted to enter holes G' in the under side of the block B<sup>2</sup> and carried by the plates G<sup>2</sup>, sliding in ways formed in the upper surface of the carriage B. The plates G<sup>2</sup> are connected by links G<sup>3</sup> with crank-pins G<sup>4</sup>, held in a rotating disk G<sup>5</sup>, which is attached to a spindle G<sup>6</sup>, journaled in the carriage B<sup>2</sup> and carrying on its lower end a worm-gear G<sup>7</sup>, which is engaged by a worm G<sup>8</sup> on a shaft G<sup>9</sup>, journaled in bearings G<sup>10</sup> upon the under side of the carriage B and having a hand-wheel G<sup>11</sup> by which the shaft is turned to rotate the disk G<sup>5</sup>. The sliding plates G<sup>2</sup> are moved out and the block B<sup>2</sup> is applied to the carriage with the pins G entering the

holes G', when the disk G<sup>5</sup> is rotated, drawing the plates in toward the center far enough to cause the pins G to bind against the side of the holes G' and hold the block B<sup>2</sup> from movement on the surface of the carriage B.

The driving-pulley C<sup>20</sup> is located at the intersection of the vertical and horizontal axes of the frame C<sup>5</sup>, so that the action of the belt by which the pulley C<sup>20</sup> is driven will not be materially affected by the angular motion of the frame C<sup>5</sup> in either a horizontal or a vertical plane. The angular movement of the frame C<sup>5</sup> in a vertical plane, or about the horizontal axis of the cross-bar C<sup>4</sup>, is slight and is due to the irregularity in the surface of the plate B<sup>3</sup>, over which the pattern-wheel rolls. The angular motion of the frame C<sup>5</sup> in a horizontal plane, or about the vertical axis of the stud C<sup>2</sup> C<sup>2</sup>, is greater in extent; but it produces only a slight twist in the belt as the yoke C<sup>9</sup> approaches each end of its traversing motion.

The screw C<sup>25</sup>, by which the pattern-wheel C<sup>21</sup> is raised and lowered within the yoke, is journaled in an arm C<sup>26</sup>, projecting from the side of the yoke, the screw entering a screw-threaded lug C<sup>27</sup> upon the side of the sliding plate C<sup>24</sup>, which carries the stud C<sup>23</sup>, upon which the pattern-wheel C<sup>22</sup> rotates. This vertical adjustment of the pattern-wheel upon the yoke C<sup>9</sup> allows the cutter-head C<sup>21</sup> to be raised or lowered, with reference to the surface of the upper carriage B, in order to determine the thickness of the completed chair-seat.

The pawl B<sup>14</sup> is preferably attached to a spindle H, journaled in the gear-wheel B<sup>15</sup>, and having upon its upper end a handle H' to allow the pawl to be conveniently disengaged from the ratchet B<sup>13</sup>. A spring H<sup>2</sup> acts upon the pawl B<sup>14</sup> in the usual manner.

The operation of the machine is as follows: The block B<sup>2</sup> to be cut is attached to the upper carriage B, in the manner described, with its surface to be acted upon directly over the corresponding surface of the pattern-plate B<sup>3</sup>. The rotating pulley B<sup>23</sup> is connected with the horizontal driving-shaft B<sup>22</sup> by means of the clutching mechanism B<sup>24</sup>, causing the rotation of the vertical shaft D and crank-arm C<sup>16</sup>, thereby vibrating the lever C<sup>11</sup> and by means of the link C<sup>10</sup> imparting an angular motion to the frame C<sup>5</sup> and yoke C<sup>9</sup> and causing the rapidly-revolving cutter-head C<sup>21</sup> to be traversed back and forth over the face of the blocks B<sup>2</sup> in a circular path concentric with the studs C<sup>2</sup> C<sup>2</sup>. As the yoke C<sup>9</sup> is traversed back and forth the pattern-wheel C<sup>22</sup> will roll over the pattern-surface of the iron plate B<sup>3</sup>, carried upon the lower carriage B', the pattern-wheel, following any irregularities in the surface of the pattern-plate, causing the yoke C<sup>9</sup> to rise and fall, as determined by the character of the surface over which the pattern-wheel C<sup>22</sup> rolls, the yoke C<sup>9</sup> being capable of a rising-and-falling motion by means of the horizontally-pivotal connection of the cross-



bar  $C^4$  within the circular frame  $C^3$ . As the revolving cutter  $C^{21}$  is carried in a circular arc across the surface of the block  $B^2$  it will cut a path varying in depth, as determined by the contour of the pattern-plate  $B^3$ , and as the cutting operation proceeds the block  $B^2$  and pattern-plate  $B^3$  are simultaneously moved along by the feeding motion of the tables  $B$  and  $B'$ , caused by the intermittent rotation of the screws  $B^6$  and  $B^7$ , as already described, so that when the block  $B^2$  has entirely passed beneath the action of the cutter-head  $C^{21}$  the upper surface of the block will exactly correspond with the upper surface of the pattern-plate  $B^3$ . The driving-pulley  $B^{23}$  is then disconnected from the shaft  $B^{22}$  and the pawl  $B^{14}$  thrown out of engagement with its ratchet, allowing the carriages to be reversed by connecting the rotating pulley  $E'$  with the shaft  $E$ .

I do not confine myself, so far as the first part of my invention is concerned, to the specific construction and arrangement of parts as herein described and represented in the accompanying drawings, as it is obvious that changes can be made which would not depart from the scope of my invention. For example, the two carriages  $B$  and  $B'$  might be arranged to move upon the same track, one carriage following the other, or the carriages might be arranged to move upon separate tracks lying in the same horizontal plane, and the cutter-head and pattern-wheel might be carried in separate frames operatively connected together, so that the movement of the pattern-wheel frame would be simultaneously imparted to the cutter-head frame and the method of so connecting the pattern-wheel frame and the cutter-head frame would come within the province of a mechanic skilled in the construction of woodworking machinery. Neither do I confine myself to the use of a frame for carrying a cutter-head or pattern-wheel and capable of an angular movement in both a vertical and horizontal plane, as it will be obvious that in lieu of a carrying-frame pivoted at one end and capable of an angular movement, such as I have shown and described, a carrying-frame for the cutter-head could be employed having a rising and falling motion in vertical ways, the entire traversing motion imparted to the cutter-head being transferred to the carriages themselves.

The gist of my invention consists in providing and combining in a machine of the character described, first, means for holding the work against the action of a revolving cutter-head; second, a revolving cutter-head, said cutter-head being capable of a traversing and feeding motion relatively to the surface of the work by means of a movement imparted either to the cutter-head, to the work, or to both; third, a pattern-plate provided with a surface corresponding to the contour which it is desired to form upon the work by the action of the cutter, and, fourth, a pattern-

wheel rolling in contact with the pattern-surface and operatively connected with the cutter-head, so that the movement of the pattern-wheel, as controlled by the pattern-surface, will be simultaneously imparted to the cutter-head.

I am aware that lathes for turning irregular forms have long been in use, in which the movement of a revolving cutter-head is controlled by the movement of a pattern-wheel rolling in contact with the pattern-surface; but in machines of this class the work is rotated against the pattern-wheel and the machine is incapable of forming an irregular surface by a traversing motion of the cutter-head over the plane surface, and a machine capable of shaping a warped or irregular surface upon the plane surface of the work in the manner I have already described I deem to be, broadly, new.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A wood-molding machine having a vibrating frame by which a cutter-head is traversed over the surface to be operated upon, a cutter-head carried upon a rotating shaft, a rotating shaft journaled on said frame and carrying said cutter-head, said shaft having its axis at right angles with the line of motion of said cutter-head as it is carried by said vibrating frame, whereby the cutting edge of said cutter-head is advanced against the wood by the movement of said frame, means for raising and lowering said cutter-head during the vibration of said frame, and means for feeding the work transversely to the line of motion of said cutter-head as it is carried by said frame, substantially as described.

2. The combination of carriages  $B$  and  $B'$ , a clamping mechanism by which the work can be attached to one of said carriages, a pattern-plate attached to the other of said carriages, connected means by which a feeding motion is imparted to said carriages, a frame capable of an angular motion in both a horizontal plane and a vertical plane, a shaft journaled in bearings on said frame and carrying a belt-pulley and a cutter-head, a pattern-roll, or pattern-wheel carried by said frame, and in contact with said pattern-plate, connected means by which an angular motion is imparted to said frame in a horizontal plane, whereby the cutter-head is traversed over said work-holding carriage, said frame being capable of an angular movement in a vertical plane, as moved by the irregularity in the surface of the pattern-plate, substantially as described.

3. The combination of carriages  $B$  and  $B'$ , connected means for imparting a feeding motion to said carriages, a yoke  $C^9$  having an attached frame  $C^5$ , pivoted within a circular frame  $C^4$ , a circular frame  $C^4$  pivoted upon studs  $C^2$ ,  $C^2$ , held by the fixed framework of the machine, a cutter-head carried by said frame  $C^5$ , a roll or pattern-wheel carried by



said yoke, a pattern-plate attached to one of said carriages and in contact with said pattern-wheel and means whereby said frame C<sup>5</sup> and connected yoke are oscillated upon their studs C<sup>2</sup>, C<sup>3</sup>, and said pattern-wheel rolled over the surface of said pattern-plate, causing a rising-and-falling motion to said cutter-head, corresponding to the irregularities of said pattern-plate, substantially as described.

4. The combination of carriages B and B', provided with screw-threaded lugs B<sup>4</sup> and B<sup>5</sup>, feed-screws B<sup>6</sup> and B<sup>7</sup> connected by gears with a shaft B<sup>8</sup>, shaft B<sup>8</sup>, gear B<sup>15</sup> turning loosely on said shaft, a pawl carried by said gear, a ratchet attached to said shaft and engaged by said pawl, a reciprocating rack engaging said gear, whereby an intermittent feeding motion is imparted to said carriages and a cutter-head revolving above the surface of one of said carriages, a pattern-plate attached to the other of said carriages, and a roll, or pattern-wheel, arranged to roll on the surface of said pattern-plate, said pattern-wheel being connected with said cutter-head, so as to raise and lower the same in corre-

spondence with said pattern-plate, substantially as described.

5. The combination of the carriages B and B', connected feeding mechanism, pivoted frame adapted to move in both a horizontal and vertical plane, a cutter-shaft journaled on said pivoted frame, a cutter-head held on said shaft, a roll or pattern-wheel carried by said frame, a vibrating lever connected with said pivoted lever and a crank-arm actuating said lever, substantially as described.

6. The combination of the carriages B and B', pivoted frame adapted to move both in a horizontal and vertical plane, a cutter-head carried by said frame, a roll or pattern-wheel carried by said frame, a pattern-plate having its surface in contact with said roll, or pattern-wheel, crank-arm and intermediate mechanism between said crank-arm and said pivoted frame, substantially as described.

Dated this 13th day of December, 1893.

EDWARD L. TAFT.

Witnesses:

RUFUS B. FOWLER,  
JAMES L. CHAPMAN.