

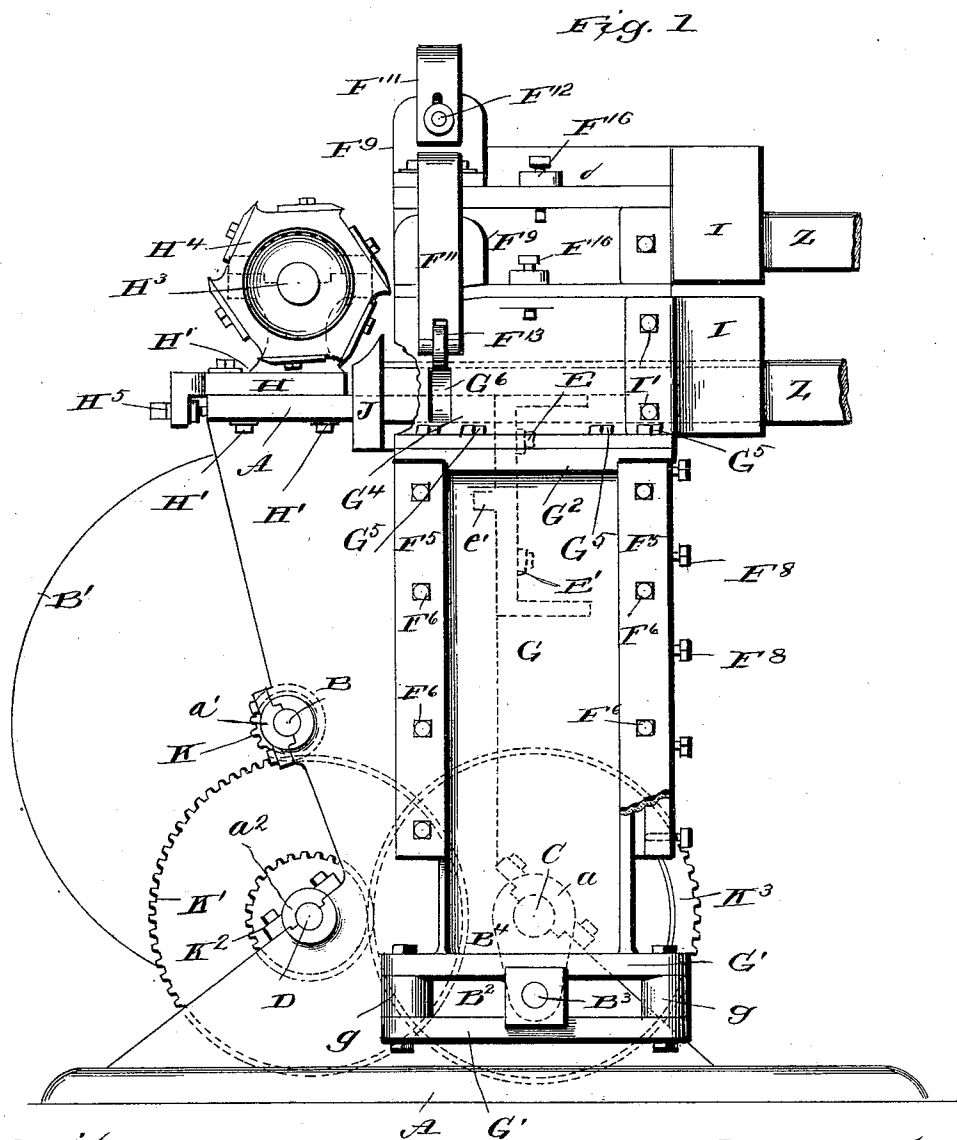
(No Model.)

4 Sheets—Sheet 1

W. S. SHERMAN.
TONGUE AND GROOVE MACHINE.

No. 538,130.

Patented Apr. 23, 1895.



Witnesses:

L. C. Hills.
C. H. Bond.

Inventor:

Willis S. Sherman,
by E. B. Stocking
Atty.

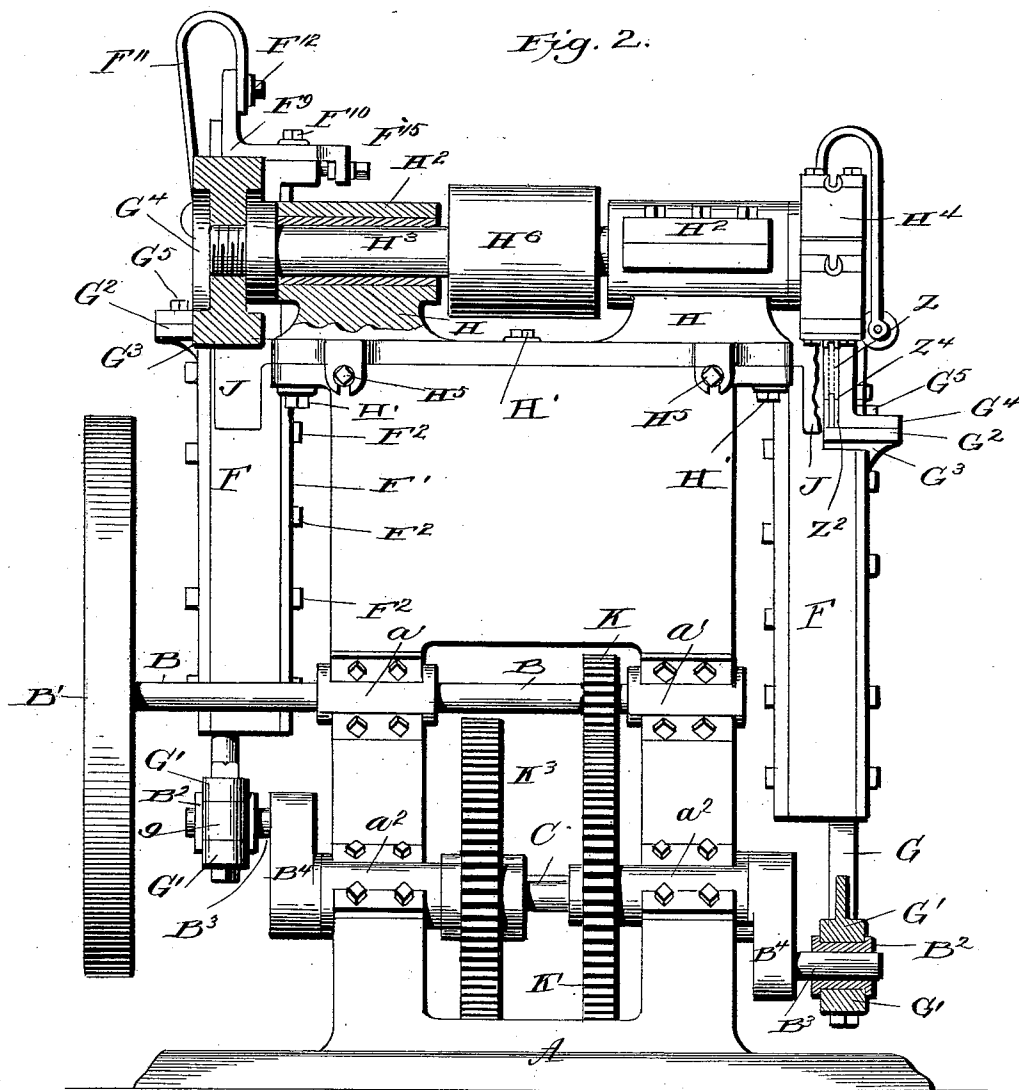
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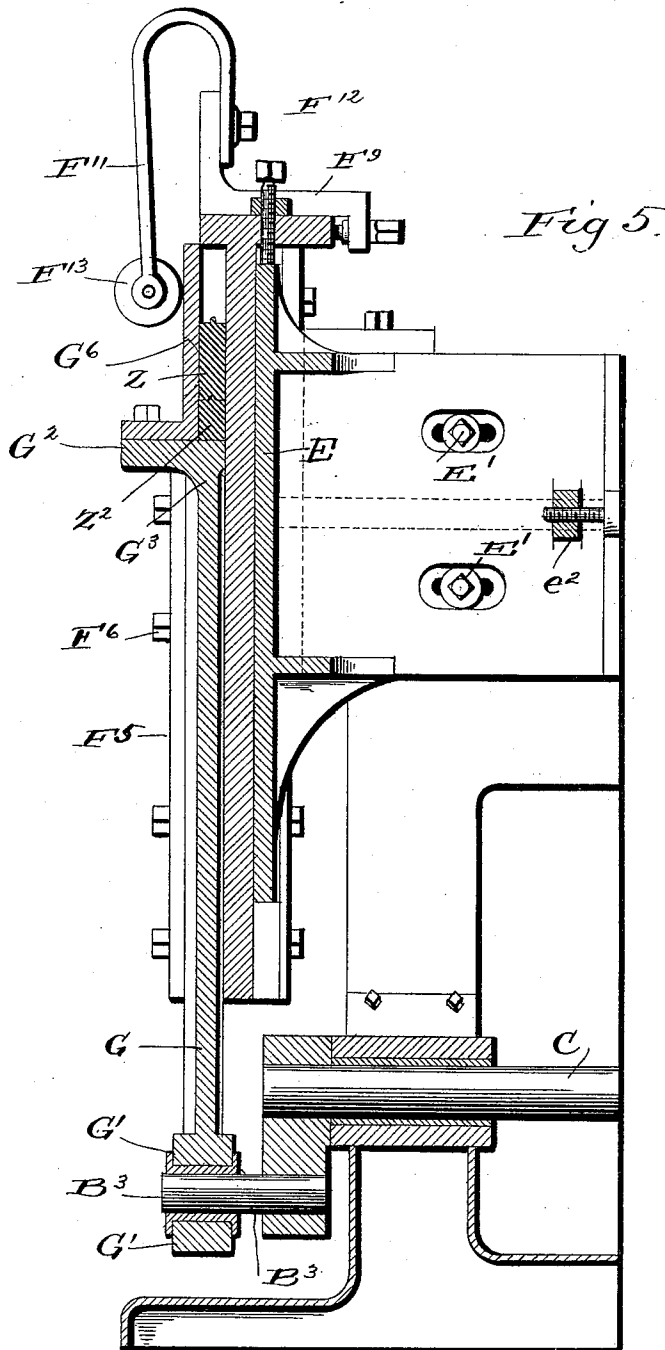
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4 Sheets—Sheet 4

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L. C. Hills.
Henry Hills

Inventor

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UNITED STATES PATENT OFFICE.

WILLIS S. SHERMAN, OF HERMANSVILLE, MICHIGAN.

TONGUE-AND-GROOVE MACHINE.

SPECIFICATION forming part of Letters Patent No. 528,130, dated April 23, 1895.

Application filed November 12, 1894. Serial No. 528,558. (No model.)

To all whom it may concern:

Be it known that I, WILLIS S. SHERMAN, a citizen of the United States, residing at Hermansville, in the county of Menominee, State of Michigan, have invented certain new and useful Improvements in Tongue-and-Groove Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in wood-working machines of that class designed for forming tongues and grooves for the purpose of matching together the ends of boards for flooring or other purposes.

It has for its objects among others to provide a simple machine that can be easily adjusted and operated and one that will do quick and accurate work. In order to provide a cheap and well-balanced machine I combine the two machines—that is, a tongue and a grooving machine in the one apparatus. As will appear from the drawings to which reference is to be had a vertical plane passed through the center line at right angles to the face of the machine would cut the machine into two similar parts except the cutter heads and knives and feed work gearing, the difference being that the one head is constructed to cut the tongue and the other to cut the groove in the board. By thus combining the two machines in one, one arbor and one set of feed works does for both sets of cutter-heads. Furthermore, by the combination one side of the machine balances the other as will be shown as the description proceeds. I further provide a combination by which the board is solidly clamped and then fed to the cutting knives and after being finished is released. The machine is so constructed that the position of the tongue or groove may be changed relative to the top and bottom of the board or strip.

Still a further object of the invention is to provide a machine with a variable feed that will feed fast where it can be done without injury to the material being acted upon and slow where there is danger of breaking out or splitting the strip which point would be just where the cutter head is finishing at the

end of its cut. This is accomplished by the crank motion as will hereinafter appear.

Other objects and advantages of the invention will hereinafter appear and the novel features thereof will be specifically defined by the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this specification, and in which—

Figure 1 is a side elevation of my improved tongue and groove machine with portions broken away. Fig. 2 is a back view with a portion broken away and parts in section. Fig. 3 is a view partly in top plan and partly in horizontal section, the section being taken on the line 3—3 of Fig. 4. Fig. 4 is a detail of the upper portion of the machine, from the front. Fig. 5 is a vertical sectional view through the crank-shaft, the heads, and the slides.

Like letters of reference indicate like parts throughout the several views.

Referring now to the details of the drawings by letter, A designates the base or bed of the machine. It is formed with the bearings or journal boxes a for the crank shaft; a' for the main driving gear shaft, and a^2 for the intermediate gear shaft, as shown best in Fig. 1. These boxes or bearings may be of any well known or approved construction. The main shaft B carries a pulley B' which derives its power from any suitable source through a belt around said pulley, the belt not being shown.

C is the crank shaft, and D the intermediate gear shaft.

To the front of the vertical portion of the base are adjustably affixed the plates E E which are provided with elongated slots or openings e as seen best in Fig. 4 and which receive the screws E'. These irons or plates are T-shaped as seen in Fig. 1 by dotted lines and the tongues or ribs e , on the backs fit into grooves in the vertical portion of the base as seen in Fig. 1. The adjacent edges of the plates E are provided with lugs e^2 as seen best in Fig. 4 which are interiorly threaded and receive a screw E² which is right and left threaded as shown. By this means the plates

or irons E may be moved independently of each other if necessary. To move either plate fasten the other plate by its screws E' and the screws E' of the plate to be moved being loosened, turn the screw E² to move the plate to its desired position, and then fasten the said plate in its adjusted position by its screws E².

The outer edges or faces of the plates E form slides E³ for the heads F which are held in position on the said slides by means of the gibs F' which are fastened to the head by means of the screws F² as shown best in Fig. 3. Wear and lost motion between the head F and the slide E³ is taken up by the gib F' and the gibs F³, the latter being adjusted by set screws F⁴ as seen best in Fig. 3. The head F receives upon the opposite side the slide G which is held in place by the gib F⁵ and screws F⁶, also the gib F⁷ which is adjusted by the set screws F⁸.

The lower end of the slide G has at right angles to its length a slide composed of the parallel plates or bars G' and the spacing blocks g as seen best in Fig. 1, and within the space between these plates or bars G' reciprocates the crank-pin box B² in which is mounted the crank-pin B³ on the crank arm B⁴ carried by the crank-shaft C all as shown best in Fig. 2. At the same time the slide G is caused to be reciprocated up and down in the head F as will be readily understood. On the upper part of the slide G is formed a shelf G² strengthened by the bracket G³, and to this shelf is fastened the angle iron G⁴ by means of screws G⁵. The opening between the angle iron and the head is large enough to admit easily the board or strip of flooring Z to be tongued or grooved. This opening is lettered Z'. The top of the head F is T-shaped and to it is fastened the angle iron F⁹ by the screws F¹⁰. To this angle iron the spring F¹¹ is adjustably fastened by the bolts F¹². In the other end of the spring is journaled the roller F¹³. The angle iron G⁴ is provided with a vertical slot G⁶ as seen in Figs. 1 and 4.

F¹⁰ are set screws adjustably mounted in the T-head of the head F and designed to be adjusted to regulate the action of the clutch, as will be hereinafter explained. The cutter heads are supported upon the frame work or base A as seen best in Figs. 2, 3 and 4 in which the frame-work or support H is shown as adjustably held to the base A by the screws H', and capable of adjustment by the screw H⁵ as shown best in Fig. 1.

H² are the arbor boxes or bearings and H³ the arbor carrying the cutter-heads H⁴ which are or may be of any well known or suitable form of construction, the one designed for forming the tongue and the other for forming the groove in the end of the strip or board. The heads are screwed onto their shaft or arbor with right and left hand threads in the usual manner so that the force of the cut tends to screw the heads on and thus tighten the same. The arbor H³ is driven by means of a belt, not shown, and the pulley H⁶ keyed

to the arbor. This pulley may be driven by belt from any suitable source of power, as from a counter shaft and from the same counter shaft, (or from another if desired,) the pulley B' and shaft B may be driven.

I is a hopper-shaped feed piece which is fastened to the angle iron G⁴ by means of screws I' as shown best in Fig. 3.

J is a stop adjustably secured in position as by the screws J' engaging in the base A as shown, the object of this stop being to be engaged by the end of the strip or board Z so that the said strip shall project the proper distance from the chuck to be acted upon by the cutters to take off the proper amount from the end of the strip. The knives or cutters of the cutter heads are removably and adjustably secured to the heads as shown and the said knives or cutters are made in such shape as to have a shear cut so that they will cut easy and smooth and so that the bottom and top corners of the strip will be smooth and clean cut. The particular shape of the knives however forms no part of this invention.

K is a gear fast on the shaft B and meshing with the large gear K' on the shaft D which shaft also has secured thereon a gear K² which meshes with a large gear K³ on the shaft C, all as shown best in Fig. 1. By this means I obtain a proper belt speed as well as a powerful feed.

In order to prevent the strip Z from splitting at the end of the cut the strip Z² is provided. This strip is fastened to the angle iron G⁴ by screws or other suitable means and rests on top of the shelf G². The end of the strip Z² is shoved against the stop J so that the end of it will be cut to shape by the cutter head. This strip has a tongue on it to fit into the groove in the strip Z to be operated upon, and the top face of the strip Z² fits the bottom face of the strip Z so that as the knives cut through the strip Z it cannot splinter because it is pressed firmly to the strip Z² by the weight of the head F.

With the parts constructed and arranged substantially as above set forth the operation is as follows:—The strips Z are fed into the machine through the guides I, and as the slide G moves up by the action of the crank, the slot G⁶ in the angle iron G⁴ comes opposite or under the roller F¹³, the roller at this time being stationary, and when the said slot and roller come coincident the roller springs into the slot and presses against the strip Z as seen in Fig. 4 at the right, where the parts are shown as up on the right and down upon the left. This spring presses the strip Z firmly against the head F. The spring and roller act upon the strip Z sidewise just before it reaches the under part of the cutter-head and the under part of the T-head of the head F which is the top face of the chuck Z'. When the strip reaches this point it forces it, in the continued movement of the crank arm, up with it. The resistance of gravity of the head F to an upward movement holds the strip firm as it

passes upward past the cutter head which cuts the tongue or groove whichever it may be. After the crank has passed the upper center the slide G with the sliding head return downward to their normal position, the head being stopped part way by the T-head striking the upper face of the slide E³ of the iron E. The point at which the head F is stopped by the slide E may be regulated by the adjustment of the screws F¹⁶, the screw being adjusted so that the screw will strike the slide E³ at the proper point in the movement of the parts. The slide G continuing on its down stroke the roller F¹⁸ is withdrawn from the slot in the angle iron so that strip Z may become loose and can be easily withdrawn from the chuck, which opens when the slide G is going down after the head F strikes or rests on the upper edge of the slide E³. The chuck closes and holds the strip when the latter reaches the point F¹⁴. The spring F¹¹ may be adjusted to the proper tension by the screw F¹³ and there held by the screw F¹⁰. The cranks are set opposite each other so that one side of the machine balances the other and when one chuck is closing and going up or feeding the material to the cutter the other chuck is going down and opening. The jaws of the chuck are square with the slides G and E so that the ends of the strips Z must always be square with the sides. In order to further provide for good square corners at Z⁴ I regulate the crank motion so that the said point travels about one quarter of an inch, more or less above a horizontal center line through the arbor H³. When the said point Z⁴ reaches this point or thereabout the chuck Z' and strip Z is traveling very slow, for the crank is about to its top center. This makes the feed very light and at just the right time to save the lower corners.

Modifications in detail may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

What is claimed as new is—

1. A machine for tonguing and grooving the ends of boards, comprising two sets of rotary cutter-heads and vertical reciprocatory duplicated devices operatively connected with a common shaft and comprising a spring-held work-holding roller, as set forth.

2. In a machine of the class described, independent tongue and grooving devices, combined with a common shaft, and alternately arranged and simultaneously oppositely movable vertical reciprocatory devices for moving the material to and from the said devices and spring pressed work-holding rollers movable with said reciprocatory devices, as set forth.

3. In a machine of the class described, the combination of rotary cutters the frame, simultaneously oppositely movable vertical reciprocatory devices for presenting the material to the cutters, and spring-held rollers for holding the material, also movable with the said devices for a part of their movement, as set forth.

4. The combination with the cutter-heads and their shaft, of simultaneously-oppositely reciprocatory devices for presenting the material to the action of the said cutter-heads, and spring-pressed rollers and cooperating devices movable with said devices for a part of their movement and constructed for automatically holding and releasing the material, as set forth.

5. The combination with the head and the cutter, of the slide its reciprocating device and its angle iron with slot, and the spring-pressed roller on said head and adapted to enter said slot and press against the material being acted upon, as set forth.

6. The combination with the head and the adjustable spring thereon carrying a roller, of the cutter the slide means for reciprocating said slide, the angle iron thereon and having a slot, said head and slide being mounted for movement independent of each other for a part of the distance traversed by the slide, as set forth.

7. The combination of the slide provided with angle iron with slot, relatively fixed cutter past which the work is to be carried, means for reciprocating said slide, the head mounted to be moved in one direction by said slide and the adjustable spring on the head carrying a roller to enter said slot to bear against the material carried by the slide, as set forth.

8. The combination of the head, the slide, the angle iron, a slot, the spring carrying a roller, means for reciprocating the slide, the relatively fixed cutter past which the work is to be carried, and means for taking up the wear between the head and slide and forming a slide for the head, substantially as described.

9. The combination of the tonguing and grooving devices the head, the slide, means for reciprocating the latter, and means for varying the range of movement of the head, as set forth.

10. The combination of the tonguing and grooving devices the head, the slide, means for reciprocating the latter, means for causing the slide and head to move together positively in one direction and returning the head by gravity, and means for regulating the length of movement of the head, as set forth.

11. The combination of the head with T-head, the slide the cutter, means for operating the same, the means for reciprocating the slide, the spring-pressed roller on the head, means for varying the pressure of said roller, and means for regulating the movement of the head, as set forth.

12. The combination with the slide, the shelf thereon the cutter fixed relatively to the slide, the means for operating the cutter, and the angle iron with slot, of the head with T-head, the angle iron on said T-head, the spring adjustably mounted on the last-mentioned angle iron, and a roller carried by the free end of said spring, as set forth.

13. The combination of the adjustable cut-

ters, the adjustable stop, the head, the reciprocatory slide connections between the head and slide whereby they move together positively in one direction and the head is permitted to return by its own weight, and the adjusting screws for varying the movement of the slide and head, as set forth.

14. The combination of the adjustable plate on the frame the cutter mounted on fixed bearings on the frame and past which the work is to be carried, the head, the gibs, the slide with its gibs, the slotted angle iron on the slide and the spring on the head carrying a roller adapted to enter the slot of the angle iron, as set forth.

15. The combination of the adjustably-mounted cutters, the adjustable stop, the head with its spring arm carrying a roller, means for adjusting the spring, the slide, the angle

iron thereon and provided with slot, and means for reciprocating the slide, substantially as specified.

16. The combination with the base and the heads the slide, means for reciprocating the same and the cutters past which the work is to be carried, of the plates bearing against said heads and provided with horizontal slots and with lugs near their adjacent edges, the bolts passed through said slots into the base, and the right and left screw engaging said lugs, substantially as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIS S. SHERMAN.

Witnesses:

R. C. HENDERSON,
HENRY ROWE.