(No Model.) 2 Sheets—Sheet 1.

S. A. WOODS & J. R. THOMAS.

PLANING MACHINE.

No. 418,345. Patented Dec. 31, 1889.

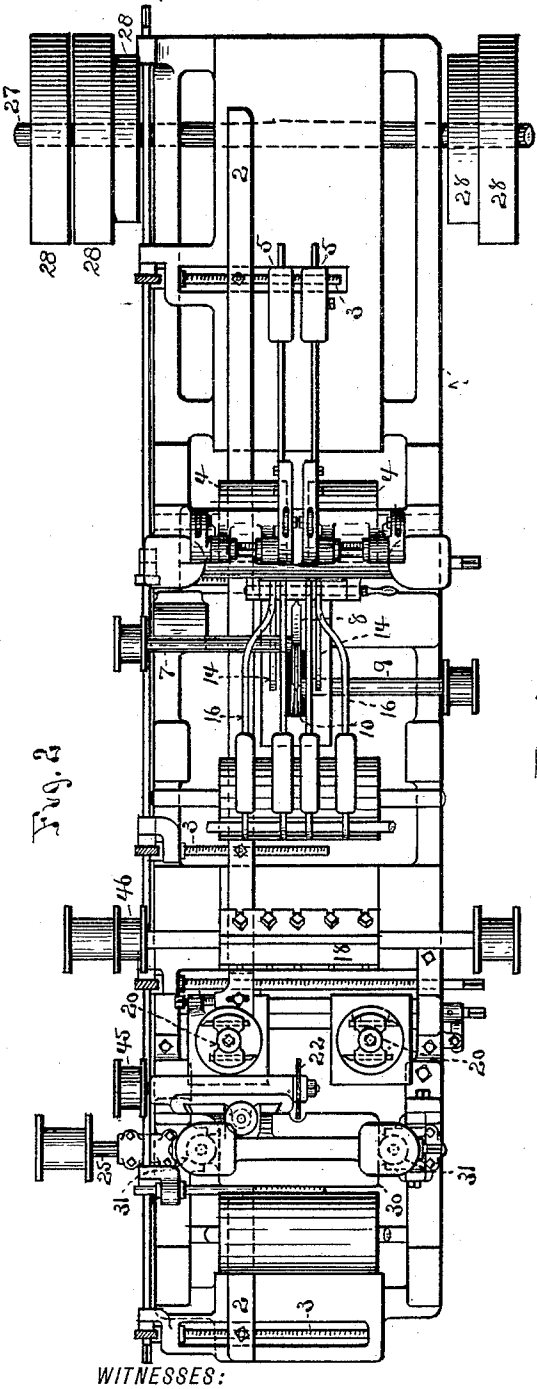


Fig. 2.

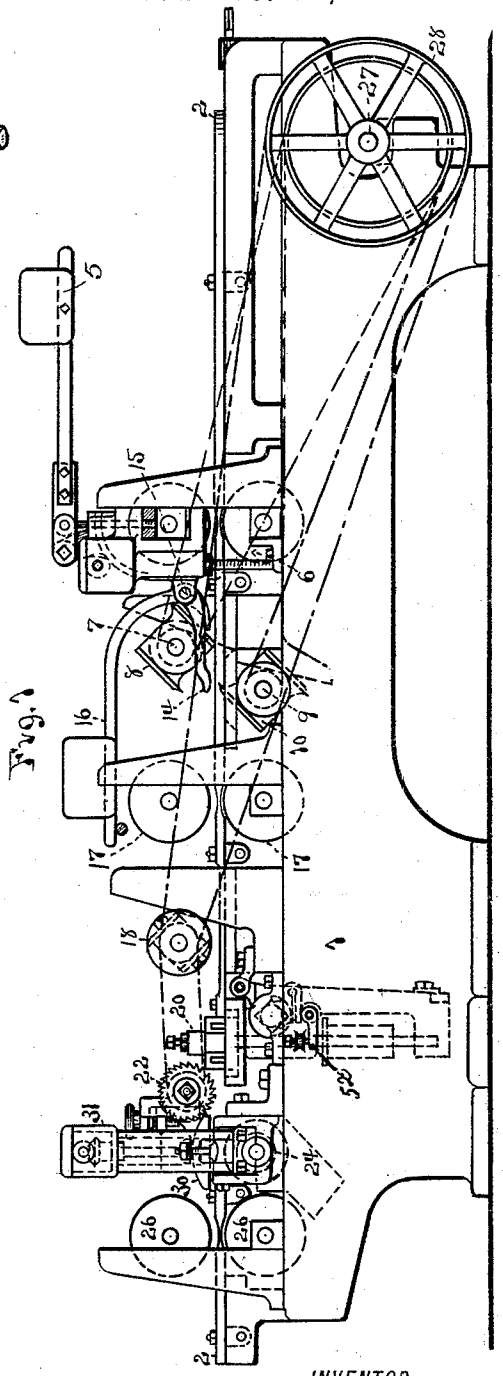


Fig. 1.

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Fig. 8

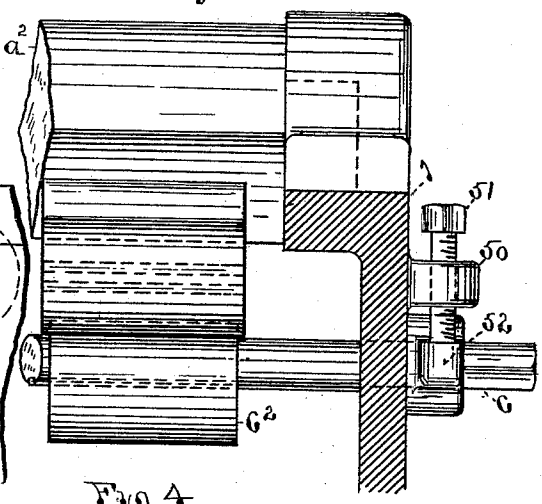


Fig. 9

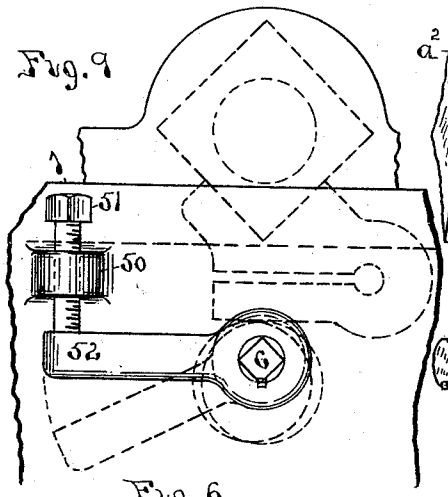


Fig. 6

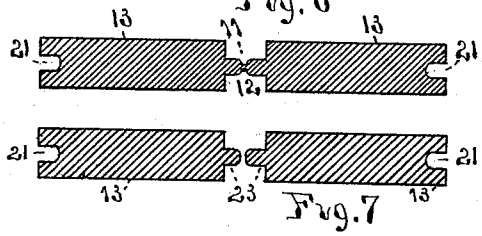


Fig. 7

Fig. 4

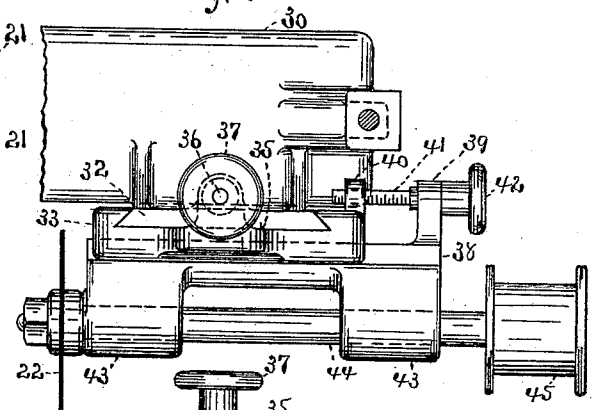


Fig. 5

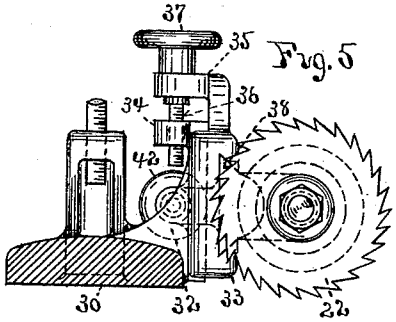
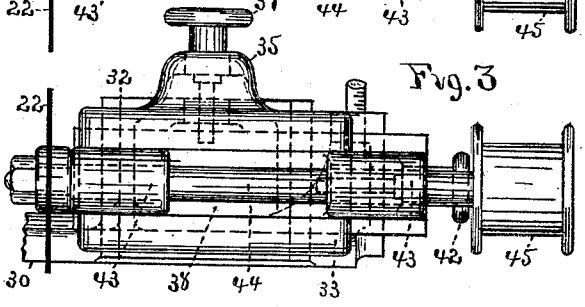


Fig. 3



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UNITED STATES PATENT OFFICE.

SOLOMON A. WOODS AND JOHN R. THOMAS, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO THE S. A. WOODS MACHINE COMPANY, OF MASSACHUSETTS.

PLANING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 418,345, dated December 31, 1889.

Application filed October 15, 1888. Serial No. 288,721. (No model.)

To all whom it may concern:

Be it known that we, SOLOMON A. WOODS and JOHN R. THOMAS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Planing-Machines, of which the following is a specification.

Our invention relates to machines for planing lumber; and it consists in certain new and improved constructions and combinations of the several parts thereof, substantially as hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of a planing-machine constructed according to our invention. Fig. 2 is a top plan view of the same. Fig. 3 is a front elevation of a portion of the same (relating to the dividing saw or cutter) enlarged to show the details. Fig. 4 is a top plan view of the same. Fig. 5 is an end elevation of the same. Figs. 6 and 7 are sections across the lumber at two different stages of its progress through the machine. Fig. 8 is a side elevation of a portion of the mechanism for securing the vertical matcher-heads in position, with the side of the frame in enlarged view. Fig. 9 is a face view of the frame, showing the arrangement of said parts partially in full view and partially by dotted lines.

The frame-work of the machine 1 is of the ordinary construction, having a bed or platen over which the lumber is fed.

2 is a side guide adjusted transversely upon the bed of the machine to regulate the same to the breadth of the lumber being dressed by means of screws 3 3 in the ordinary manner.

4 4 is the divided feed-roll at the feed-in end of the machine, held down by levers and weights 5 5 to feed the lumber forward in conjunction with the lower feed-roll 6.

7 is a horizontal shaft mounted and projecting transversely inward above the path of the lumber through the machine and provided with a cutter-head 8 upon its inner end for forming the upper tongue-groove through the central portion of the board preparatory to dividing the board into two parts tongued on their inner edges, as hereinafter described.

9 is a horizontal shaft projecting transversely inward from the opposite side of the machine below the path of the lumber, and having the cutter-head 10 mounted on its inner end to make the corresponding tongue-groove in the lower surface of the board directly underneath the upper one. The upper tongue-groove 11, formed by the upper cutter, is of the shape in cross-section shown in Fig. 6, and the lower tongue-groove 12 is of the shape shown in cross-section in that figure as they appear in the board 13 after having passed the cutter-heads 8 and 10.

14 14 are presser-fingers, which hold the board down to the bed as it is being acted upon by the tonguing-cutters 8 and 10. These presser-fingers are pivoted at 15, and their upper ends are extended upward and forward in the shape of arms 16, provided with weights which hold the presser-fingers down upon the lumber while it is being operated upon.

17 17 are feed-rolls, which feed the lumber forward to the single long planing cutter-head 18, which serves to dress the upper surface of the board and remove any burr from the edges of the groove 11 which may have been left by the cutter-head 8 in forming it.

The purpose of leaving the two parts of the board with a connection between the partially-formed tongues, as shown in Fig. 6, is to prevent the two parts of the board from closing irregularly together when passing the vertical grooving cutter-heads 20 20, as they would do if the intervening wood were removed from between the tongues before reaching these cutter-heads. The vertical grooving-heads 20 20 form the grooves 21 21 in the outer edges of the board 13, and they are constructed in the usual manner and mounted upon vertical spindles for this purpose. If the board were divided into two parts, as shown in Fig. 7, before reaching these cutter-heads, the irregular closing together of the two parts of the board permitted by the removal of the wood from between the tongues would cause the grooves 21 21 formed by the cutter-heads 20 20 to be slightly irregular in their depth, corresponding with the varying movements of the two parts of the board toward each other when subjected to the side-thrust of these grooving cutter-heads, com-

bined with the dip and lifting action of the long planing-cylinder in advance of these side cutter-heads 20 20 and the forcing action of the feed-rolls in advance of the long cylinder, which drive the board forward through the machine; but with the board in the stage of formation and division shown in Fig. 6 its two parts 13 13 are held in a fixed relation to each other, and the grooves 21 21 are made absolutely alike in depth throughout the entire length of the board, thus preventing, when a large number of the boards are laid in a floor, a variation or irregularity in the space a given number of a particular dimension will cover and saving annoyance to the carpenter. It is evident that as the board passes through the machine it is being subjected to the action of the feed-in rolls, the cutter-heads 8 and 10, the long planing-cylinder 18, the vertical outside grooving-heads 20 20, and the saw or cutter 22 at the same time, and the order of succession of the several simultaneous operations they perform, as described, prevents the action of either one of these mechanisms from interfering with the others while completing the planing and tonguing and grooving of each strip into which the board is divided in a proper manner at a single passage of the board to be divided and thus prepared through the machine. By "tonguing and grooving in a proper manner" we mean by a single passage through the machine, so that the tongue of any one strip will properly fit the groove of any other strip which is made from the board at the same operation, and vice versa. In order to accomplish this, it is necessary that the tongue and its shoulders on the edge of the board shall be free from slivers and cut perfectly true and smooth and cut straight along the edge, and that the groove on the opposite edge of the same board shall be cut exactly parallel with the tongue and of even depth to receive it, and any imperfection in either of these respects will render nugatory the perfection in others of the complementary tongue or groove. If, therefore, the cutters of the cutter-heads 8 and 10 entirely complete the formation of the tongues on the two strips of the divided board by severing and separating them as in former machines, the action of the long planing-cylinder in dressing off the slivers made by cutter-heads 8 and 10, combined with the action of the feed-in rolls, which drive the board forward, will cause the outer edges of the divided board, as it passes the vertical grooving-heads 20, to move in and out against these heads and so cut the grooves in their edges irregularly and out of parallel with the previously-completed tongues, and so as to not correspond with the latter. Each strip of board therefore comes out of the machine imperfectly finished and unfit for nice builders' work. This improper action of the vertical grooving-heads upon the divided board is partly due to the dip and lift action of the long planing-cylinder in advance of the former, which tends to lift the divided board from the bed, and by its irregular strain against harder and softer parts of the wood causes the strips passing under it to press toward one side or the other of the machine in the space left between the strips of the board by their previous division. By our arrangement, however, this disadvantageous action of the feed-in rolls and long cylinder 18 while completing the finishing of the shoulders of the tongues formed by cutter-heads 8 and 10 upon the operation of the vertical grooving-heads 20 is avoided, because, the strips into which the board is to be formed not being completely divided when they pass under the long cylinder 18, the strain and lifting action of that cylinder in dressing off the shoulders of the tongues cannot vary their forward movement and so interfere with the proper and perfect formation of the grooves by the cutter-heads 20. Hence the removal of the dividing-cutter for the tongues from before the cylinder 18 and placing it after the vertical grooving-cutters 20 20 prevents the grooving cutter-heads 8 and 10 and cylinder 18 from interfering with the grooving-cutters in their operation in forming complementary grooves to the tongues being simultaneously formed upon the strips of the divided board. After the board 13 has passed the vertical cutter-heads 20 20 it reaches the dividing saw or cutter 22, which cuts out the intervening wood between the partially-formed tongues and completes the tongues 23 23, as shown in Fig. 7. The board then passes above the lower long planing-cylinder 24, (shown in dotted lines in Fig. 1,) which is of the ordinary construction and mounted upon the horizontal shaft 25, which dresses the lower surface of the divisions of the board and removes any burr which may have been formed by the tonguing-cutter 10 in forming the groove 12. The board is thus completed, and is fed out of the machine by the feed-rollers 26 26, and its two parts have their tongues and grooves 21 and 23 perfectly regular and fitting each other as accurately as possible. The grooving cutter-heads 20 20 are driven by pulleys upon their vertical shafts belted to the counter-shaft 27 at the feed-in end of the machine, which is a sufficient distance from the vertical grooving-cutter-head shafts to allow of the belt being turned to pass from the horizontal pulley of the counter-shaft to the vertical pulley of the grooving-cutter-head shaft without unduly straining the belt in operation. By the succession of the tonguing-heads 8 10, long planing-cylinder 18, vertical grooving-heads 20 20, and saw 22, bringing the saw after the grooving-heads, the accuracy of the tongues and grooves and their complete finish without burrs or splintering of the edges of the board is attained, as before described.

The feed-rolls are driven by the ordinary expansion-gearing, which is not shown, for

the sake of clearness, and the feed-rolls 17 17 may be omitted without affecting the operation of our invention materially, if desired. The cutter-heads are driven by pulleys in the ordinary manner belted to the counter-shaft 27, which is supplied with pulleys 28 28 28 for that purpose, and will need no further description to have their operation understood.

In order to provide for the proper adjustment and operation of the saw 22, we attach it to the platen 30, which supports the lumber over the lower planing-cylinder 24 in the ordinary manner. The platen 30 is mounted in standards 31 31, attached to the frame of the machine on each side of the bed, and is raised up and down by screws and bevel-gears (shown in dotted lines in Figs. 1 and 2) in the usual way. On the side of the platen 30 is formed or attached the vertical guide-strip 32, Figs. 3, 4, and 5, on which is fitted the plate or block 33 so as to slide up and down thereon. A nut 34 is attached to the guide-strip 32, and the sliding plate 33 has a shoulder 35 offset on its upper side, so as to overhang the nut. In the shoulder 35 is journaled the screw 36, which passes through and engages with the nut 34, and is provided with the hand-wheel 37 at its upper end. By revolving the screw 36 the plate or block 33 will be adjusted up and down and secured at any desired point. The outer face of the plate 33 is provided with a horizontal groove having its edges undercut, and in this groove is fitted the inner face of a plate 38, so that the undercut edges of the groove hold it in place. The plate 38 is provided with an offset or shoulder 39, and a nut 40 is attached to plate 33.

In the shoulder 39 is journaled the screw 41, which passes through and engages with the nut 40, and is provided with a hand-wheel 42 on its outer end. By revolving the screw 41 with this hand-wheel the plate 38 will therefore be adjusted horizontally in plate 33 and secured in any desired position. Upon the plate 38 are attached boxes 43 43, which carry the horizontal shaft 44, to which the saw 22 is attached at one end. At the other end a pulley 45 is attached, which extends outside of the frame of the machine, and is belted to the pulley 46 upon the shaft of the planing-cylinder 18 by a straight belt. By this construction of parts the saw 22 can be adjusted both horizontally and vertically to bring it into the proper position to remove the surplus material between the tongues 23 23 of the board, no matter what the thickness of the board may be or to what height the platen 30 may be adjusted, while the adjustment of the platen itself up and down also adjusts the saw with it, and the platen affords a rigid and perfect support for the saw itself.

Figs. 8 and 9 show an auxiliary stop applied to the shaft, by which the yokes of the shafts of the cutter-heads 20 20 are held in place, so as to prevent the shaft from being turned too far in loosening and adjusting the cutter-heads in their position transversely of the machine. The yokes of the vertical cutter-heads are mounted upon a cross-bar a^2, extending transversely of the machine, in the manner described in the Patent No. 388,169, granted to us August 21, 1888, to which reference may be had for the construction of the parts of the machine not herein shown. The cross-bar a^2 in this instance is made rectangular instead of round, as in that patent.

c is the shaft having the cam c^2, by which the yoke is secured to the bar a^2. When this shaft c is revolved to loosen the yoke from the bar, it is apt to be revolved too far. We therefore attach to the outside of the frame 1 a lug 50, having a screw-threaded hole through it, in which we fit the set-screw 51, and on the shaft c we attach the stop-arm 52 in such a position that its end will come against the end of the set-screw when the shaft has been turned far enough to release the yoke from the bar a^2, thus forming an adjustable stop to regulate the turning of the shaft c, as described.

If it is desired to plane the board upon only one face, the lower planing-cylinder 24 may be omitted; but it is necessary when the board is to be dressed on both faces.

The vertical grooving-heads 20 20 may be provided with throat-blocks for guiding the board between them, like the block o' described in our patent, No. 388,169, before referred to.

In case it is desired, the heads 8 and 10 may be removed from their spindles and the saw 22 used to divide the board after the grooving-heads 20 20, when the lower planing-cylinder will remove any burr or roughness upon the face of the board caused by cutter 22, and the latter will not, by a previous dividing of the board, interfere with the accuracy of operation of the grooving-heads 20 20.

What we claim as new and of our invention is—

1. In a planing-machine for dividing a board into two strips and tonguing and grooving them at one operation, the combination of feed-rolls, the upper and lower tonguing-heads 8 and 10, mounted on horizontal spindles above and below the path of the board through the machine, the single long planing-cylinder arranged to dress the surface of the board after it has passed the tonguing-cutters, the vertical cutter-heads 20 20, mounted upon each side of the path of the board and adapted to groove its outer edges, and the saw or cutter 22, mounted upon a horizontal spindle and arranged to divide the two strips of the board longitudinally between their tongues in the grooves formed by the tonguing-heads after it has passed the vertical cutter-heads 20, substantially as described.

2. In a planing-machine for dividing a board into two strips and tonguing and groov-

ing them at one operation, the combination of feed-rolls, the upper and lower tonguing cutter-heads 8 and 10, mounted on horizontal spindles above and below the path of the board through the machine, the long planing-cylinders 18 and 24, arranged to dress the opposite surfaces of the board after it has passed the tonguing-cutters, the vertical cutter-heads 20·20, mounted upon each side of the path of the board and adapted to groove its outer edges, and the saw or cutter 22, mounted upon a horizontal spindle and arranged to divide the two strips of the board longitudinally between their tongues in the grooves formed by the tonguing-heads after it has passed the vertical cutter-heads 20, substantially as described.

3. The combination, in a wood-planing machine, of feed-rolls, the tonguing cutter-heads 8 and 10, mounted on horizontal spindles above and below the path of the board through the machine, the vertical grooving-heads 20 20, mounted upon each side of the path of the board and adapted to groove its outer edges, the long planing-cylinder 24, arranged to dress the surface of the board after it leaves the tonguing-heads 8 and 10, the platen 30 above the same to hold the lumber down, and the saw or cutter 22, mounted on a horizontal spindle, having its boxes attached to said platen and arranged to divide the two strips of the board longitudinally between their tongues in the grooves formed by the tonguing-heads after it has passed the vertical cutter-heads 20 20, substantially as described.

4. The combination, in a wood-planing machine, of the planing-cylinder 24, its platen 30, arranged to hold the lumber against the action of the same and made adjustable vertically, the saw or cutter 22, mounted in advance of the same upon a horizontal spindle, having its boxes adjustable vertically and horizontally upon said platen, and the vertical cutter-heads 20 20, mounted upon each side of the path of the board and adapted to groove its outer edges in advance of said cutter 22, substantially as described.

5. The combination of the transverse girt a^2, the yokes of the vertical cutter-heads 20, mounted thereon, the revolving shaft c, passing through said yokes and provided with cam c^2, for clamping said yoke to the girt, the arm 52, attached to shaft c outside of the frame 1 of the machine, and the set-screw 51, mounted in lug 50 on the frame and arranged to form an adjustable stop for said arm when the shaft is revolved, substantially as described.

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