

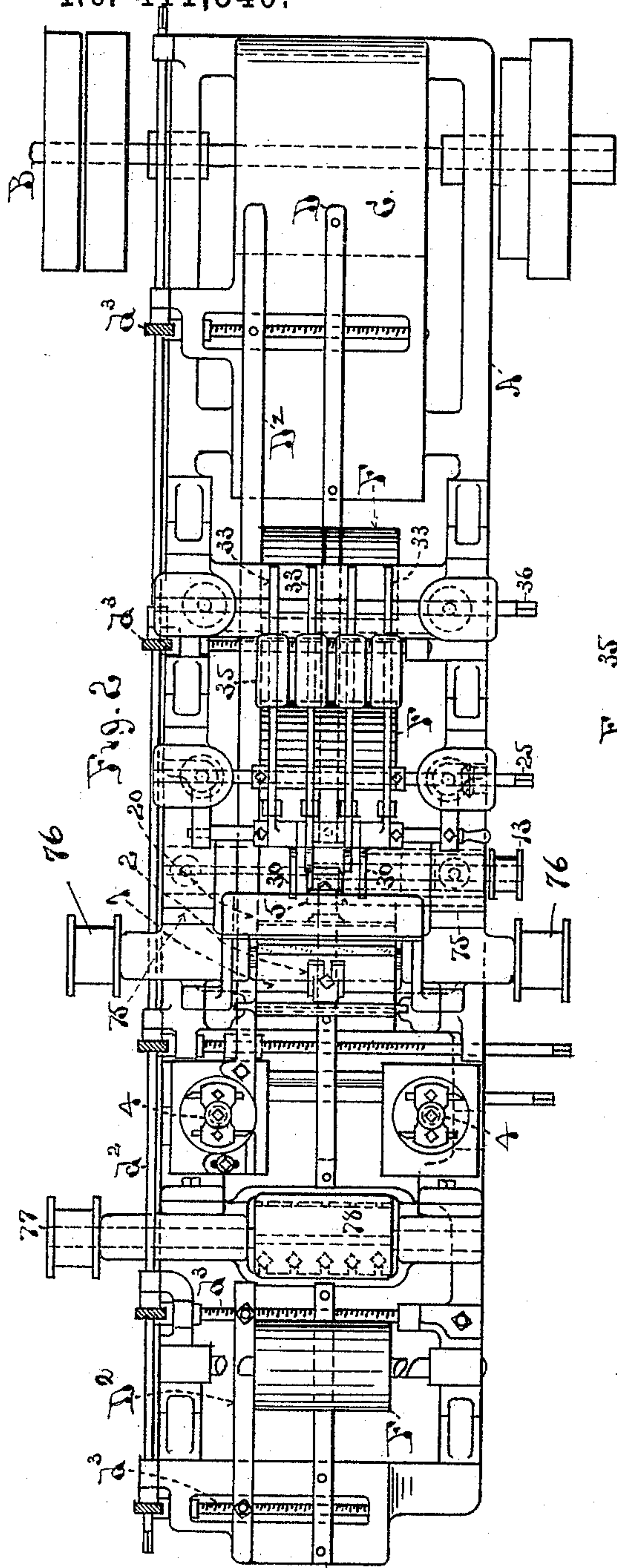
(No Model.)

3 Sheets—Sheet 1.

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

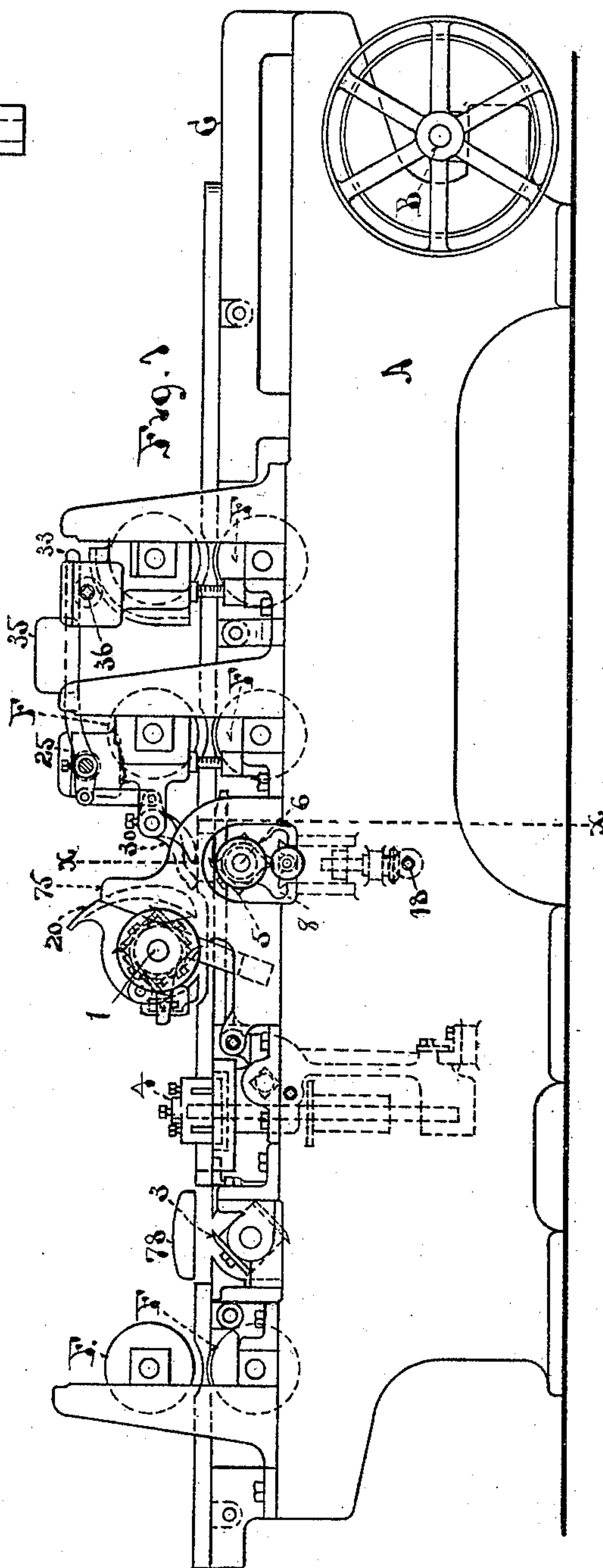
No. 411,540.

Patented Sept. 24, 1889.



WITNESSES:

N. P. Ockington.
C. J. Poland



INVENTOR

Solomon A. Woods
BY *John R. Thomas*

David H. Rice

ATTORNEY

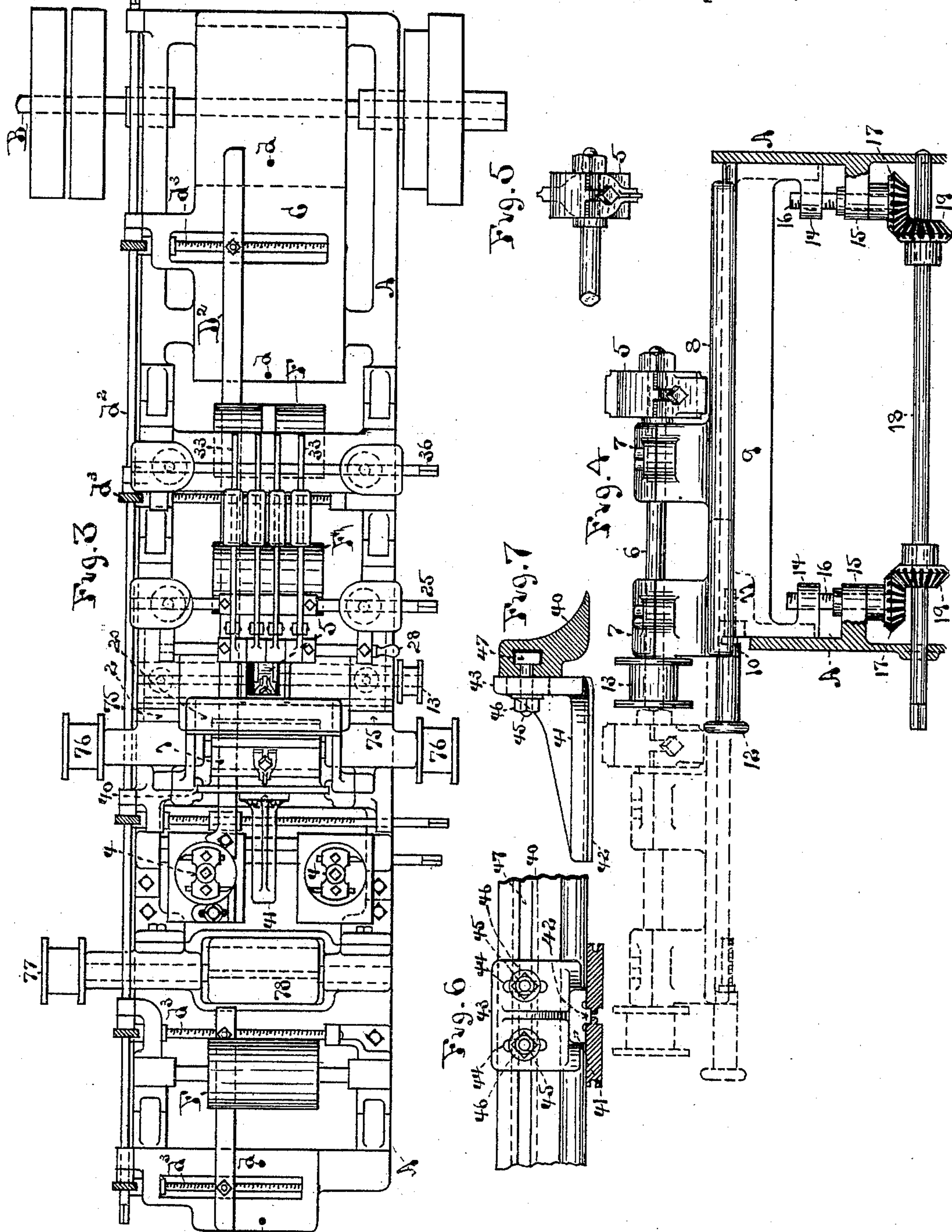
(No Model.)

3 Sheets—Sheet 2.

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

No. 411,540.

Patented Sept. 24, 1889.



WITNESSES:

N. P. Ockington
C. J. Toland

INVENTOR
Solomon A. Woods
John R. Thomas
BY
David Haeberle
ATTORNEY

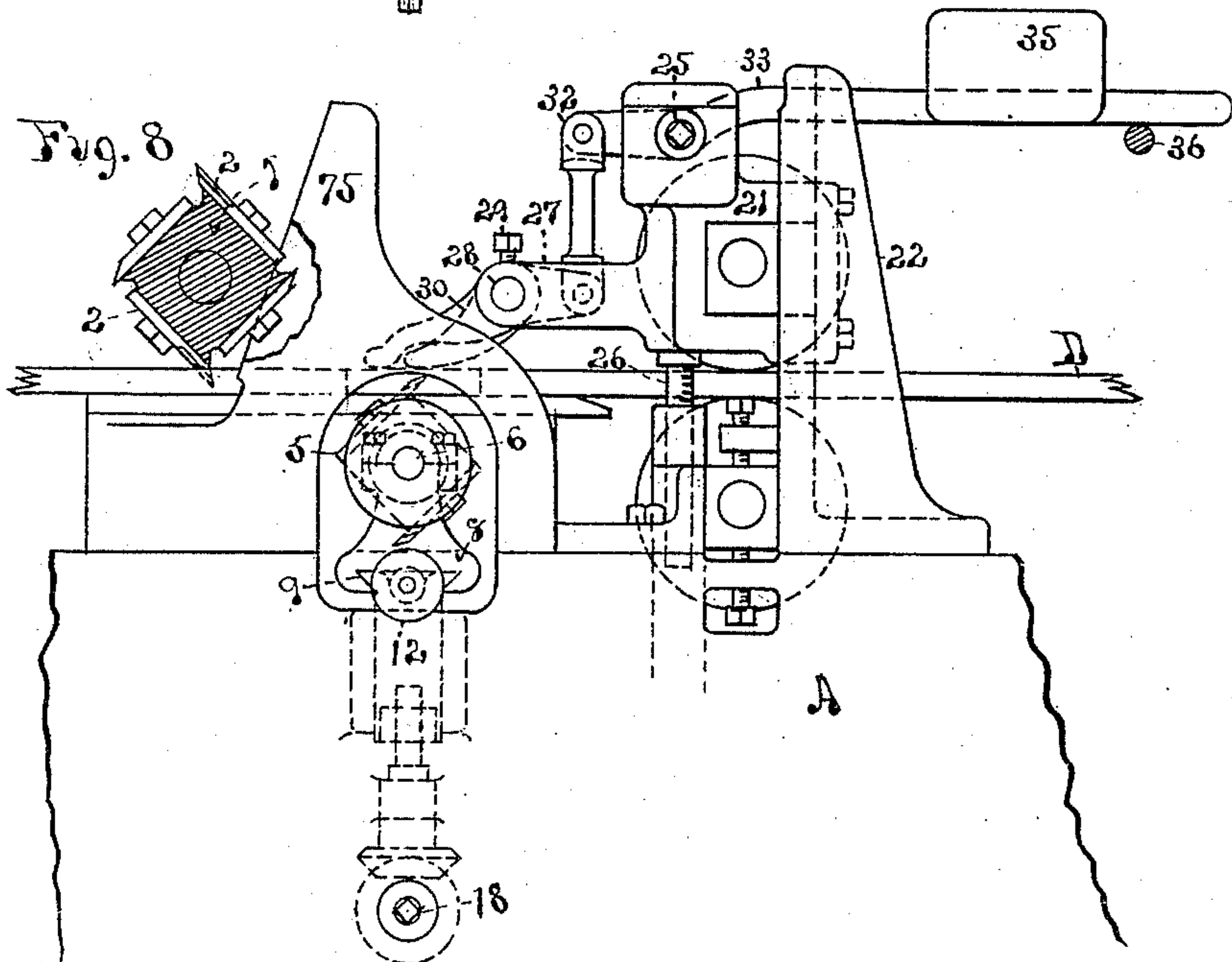
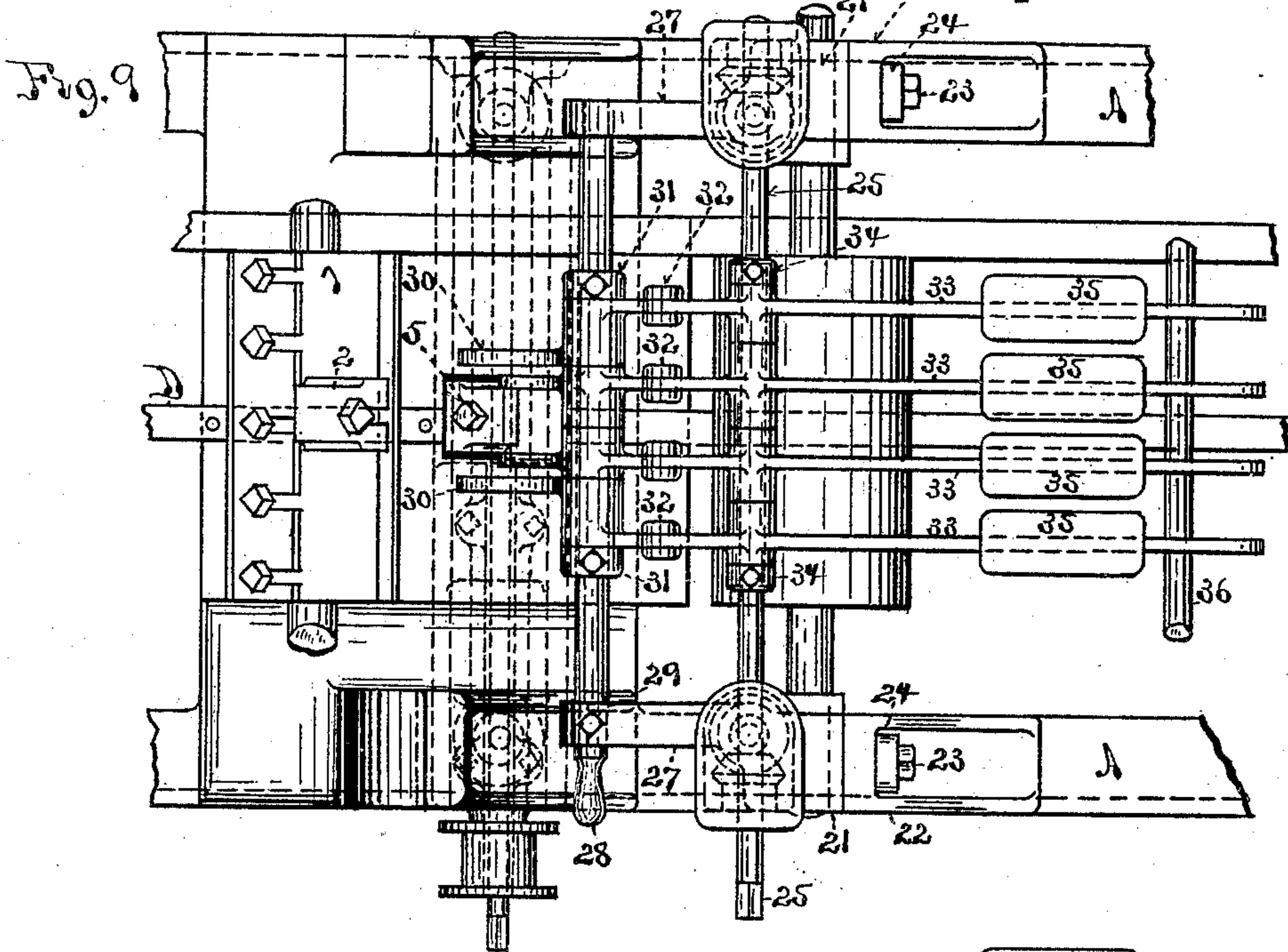
(No Model.)

3 Sheets—Sheet 3.

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

No. 411,540.

Patented Sept. 24, 1889.



WITNESSES:

N. P. Ockington.
C. J. Poland

INVENTOR

Solomon A. Woods

John R. Thomas

BY

David H. Heston

ATTORNEY

UNITED STATES PATENT OFFICE.

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

PLANING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 411,540, dated September 24, 1889.

Application filed December 8, 1888. Serial No. 293,016. (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
5 invented a new and useful Improvement in Planing-Machines, of which the following is a specification.

Our improvement relates to machines for planing wood; and it consists of certain new
10 and useful 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 with our
15 improvements applied thereto. Fig. 2 is a top plan view thereof, showing the machine with the central guide applied to dress and tongue and groove two boards at once. Fig. 3 is an
20 other top plan view of the same with the central guide removed and the attachments applied to enable the machine to divide a single board into two strips and tongue and groove the same at one operation. Fig. 4 is a transverse
25 section on the dotted line *xx* of Fig. 1, showing the lower tonguing cutter-head with its drawing-out mechanism. Fig. 5 is a view of the lower cutter-head provided with the cutters used in the machine shown in Fig. 3. Figs. 6 and 7 are a side view and cross-section
30 of a portion of the pressure-bar on the feed-out side of the top planing-cylinder, with an attachment for guiding and supporting the boards attached thereto. Fig. 8 is an enlarged side elevation of a portion of the machine, partly in section, to show the details of
35 construction of the weighting of the hold-down fingers. Fig. 9 is a top plan view of the same.

A is the frame of the machine, which sustains the operating parts.

B is the counter-shaft, which carries the tight and loose pulleys and pulleys for driving the feed-rolls, cylinders, and cutter-heads in the usual manner.

45 F F are the feed-rolls.

C is the bed of the machine, over which the lumber passes.

D is the central guide, which is used when two boards are to be dressed at the same time.

This guide is secured to the bed C by pins or
50 bolts passing into holes *dd* in the latter.

D² is the side guide, which is adjusted transversely of the bed by the shaft *d*² and screws *d*³.

The upper long planing-cylinder 1 has at-
55 tached to two of its opposite faces the ordinary planing-knives; but upon the other two faces are attached short cutters or knives 2 2, which are so formed and proportioned (in case the central guide D is employed, as in Figs. 60
1, 2, and 9) that they will cut the upper half of the tongue upon the inner edges of the two boards passing through, which are adjacent to the central guide D. This arrangement of
65 the knives upon the cylinder 1 insures that no burr or roughness shall be left on the edges of the groove cut by the knives 2 in the board. In case the central guide D is removed and a single board is to be divided into two and
70 tongued and grooved by the machine arranged as shown in Fig. 3, cutters 2, like that shown in the latter figure, are attached to the cylinder 1.

The lower long planing-cylinder 3 is placed
75 in the usual position near the feed-out end of the machine and on the feed-out side of the vertical grooving-heads 4 4. In order to complete the formation of the tongues, however, it is not found expedient to attach cutters like 2 2 to this lower planing-head, because it
80 must necessarily be placed so far away from the upper planing-head 1 that it is very difficult to get the lower sides of the tongues cut by such lower planing-head to correspond exactly with the upper sides of the tongues cut
85 by the upper one. This difference, no matter if but slight, will be multiplied to such an extent as to become serious when the boards are laid down and fitted together in large numbers—for a floor, for instance. It is therefore
90 necessary to provide the short cutter-head 5, which has no other function than to groove out the boards on their under inner edges and form the lower parts of the tongues, in order to place it as near to the long planing-cylinder as possible, and nearer than any lower
95 surface-planing cylinder could be brought, because a surface-planing cylinder must have a

platen or bed on the opposite side of the board to enable it to work as effectively as is desirable. We therefore place the cutter-head 5 underneath the path of the boards through the machine and slightly toward its feed-in end from the upper planing-cylinder, mounting it upon the horizontal shaft 6, Figs. 1 and 4. Shaft 6 is mounted in boxes 7 7, in which it revolves, and these are attached to the plate 8. The latter is made with a dovetail groove formed longitudinally in its under surface, which fits over a corresponding dovetail surface on top of girt 9, so as to slide thereon. An ear 10 projects downward from plate 8, in which is journaled the shank of screw 11, having a hand-wheel 12 thereon. This screw is tapped into a hole in girt 9. The shaft 6 has a pulley 13 on its outer end, which, with the hand-wheel 12, projects through an opening in one side of frame A, through which the plate 8 and boxes and cutter-head 5 may be drawn out of the machine by unscrewing the screw 11 from girt 9. This screw also serves to adjust the plate 8 transversely of the machine to bring the cutter-head 5 and its cutters into exact adjustment with the cutters 2 2 of planing-cylinder 1. The girt 9 is formed with ears 14 14, attached to downwardly-projecting extensions upon its ends. The ends of the girt and these extensions are fitted into vertical grooves on the inner faces of the frame A of the machine. Ears 15 15 project inward from these faces of the frame directly under the ears 14 14 of the girt. The vertical screws 16 16 are journaled in the ears 15 and tapped into the ears 14. On the lower ends of these screws are the bevel-pinions 17 17. A revolving shaft 18 is mounted in the frame A transversely under the screws 16 and has one end projecting beyond the frame and squared for the application of a crank or wrench to turn it. On this shaft are secured the bevel-pinions 19 19, engaging with pinions 17 17. By revolving the shaft 18 the girt 9 is adjusted up and down, carrying with it the cutter-head 5, and thus enabling the depth of cut to be easily and quickly adjusted.

By mounting the lower tonguing cutter-head on a horizontal shaft extending inward from one side of the machine-bed and attaching the cutters to its inner end, and using it in conjunction with the tonguing-cutters on the long planing-cylinder, we obtain certain advantages of adjusting, removing, and replacing the cutters of the lower head which would not be possible if it were attached to a shaft extending across the machine-bed, especially since the long planing-cylinder must extend across the bed and take up a great deal of room with its solid bed beneath it, also necessarily extending across the machine.

By attaching the upper tonguing-cutters to the upper long planing-cylinder and employing the lower tonguing cutter-head 5 in immediate conjunction therewith, and especially

between the adjacent feed-roll and the cylinder, we obtain the same advantages as by employing upper and lower tonguing cutter-heads in immediate conjunction in advance of the planing-cylinders, so far as producing an exact correspondence in the opposite sides of the tongue on the finished boards is concerned and smoothness of finish of the work. This is not possible where the tonguing-cutters on one side of the board are attached to the upper planing-cylinder and on its other side to the under one—as, for instance, to cylinder 3—because the slight movement transversely of the board in passing through that distance and being operated on by other cutters or rolls brings such tonguing-cutters attached to cylinder 3 out of vertical line with the groove already cut in the top side of the board, and these therefore cut the tongues deeper or less into the divided edges of the two resulting boards on one side than the other, thus destroying that absolute uniformity of both sides of the tongue which is essential to its value. At the same time we dispense with one tonguing cutter-head, with all its adjusting attachments, and do not impair the effective operation of the long planing-cylinders in surfacing the boards. The lower planing-cylinder 3, operating upon the surface of the board after the tonguing cutter-head 5, takes all the roughness or burr off of the edge of the board raised by the latter in cutting the tongue.

In order to hold the board down against the lifting action of the cutter-head 5, it is found desirable to have separate weighted fingers or hold-downs introduced between the feed-rollers and feed-in pressure-bar 20 of the long surfacing-cylinder 1. To introduce and weight these hold-downs in this limited space, we employ the following construction: The boxes 21 of the upper feed-roller F, nearest to planing-cylinder 1 on the feed-in side, move up and down on the vertical standards 22 22, extending upward from frame A on each side. This is accomplished by means of the bolts 23, secured by nuts 24, through vertical slots in the standards, made long enough to allow of the necessary up-and-down movement of the boxes. The horizontal revolving shaft 25 passes through housings on the upper part of the boxes, and is provided with bevel-pinions engaging with bevel-pinions on the upper ends of the screws 26 26, which are journaled in the boxes and have their lower ends tapped into the frame of the machine. This construction of these parts is well understood and indicated by dotted lines in the housing shown in Fig. 9, and does not require further description.

On the faces of the boxes 21 21, projecting toward the planing-cylinder 1, are long ears 27 27. In the end of these ears is mounted the bar 28, held in place by set-screw 29 in one of the ears. On this bar 28 is pivoted the bearing or pressure fingers 30 30 30 30 on each side of and over the path of the cutters of the

cutter-head 5. These fingers 30 turn on the bar 28 by means of sleeves fitting the bar, and are held in place by collars 31, secured to the bar by set-screws, as shown partially in Figs. 2, 3, and 9. Short arms project outward from these sleeves on their sides opposite to the bearing-fingers 30. To these projecting arms links 32 32 are pivoted, which extend upward therefrom and are pivoted at their upper ends to the shorter ends of levers 33 33, which have sleeves fitting over the shaft 25 and allowing them to turn thereon, and held in place on said shaft by collars 34, secured to the shaft by set-screws. The long ends of the levers 33 are provided with weights 35, which produce the pressure upon the bearing-fingers 30 through the intermediate links 32. These longer ends of the levers are prevented from descending too far by coming in contact with the shaft 36, which is connected to the boxes of the first upper feed-in rollers in a similar manner to the connection of the shaft 25 to its feed-in roller, as hereinbefore described. This construction of the mechanism for weighting the holding-down fingers 30 allows of a sufficient length of lever to produce the requisite pressure thereby on the board and brings the weighting of the levers above the other working parts, where it can be readily adjusted. These weighted hold-down fingers 30 also prevent the action of the tonguing cutter-head 5 from disturbing the nip of the feed-in pressure-bar 20, upon which depends the perfect action of planing-cylinder 1, and thus enable the cutter-head 5 to be used in conjunction with the long single planing-cylinder 1, as hereinbefore described.

When this machine is used with the central guide D removed and the tonguing and dividing cutters (shown in Figs. 3 and 5) for tonguing, grooving, and dividing a single board into two at one operation, it has been found that the action of the last pair of feed-rolls F in conjunction with the preceding feed-rolls, when given the necessary set to hug one edge of the board against the guide D², caused the board or one strip thereof to be finished slightly narrower in the middle than at the ends and to produce flooring which, when laid and fitted together in a large number of strips, brought the final strip out curved instead of in a right line, on account of the narrowing in the middle of the strips of flooring. This effect always occurs when the tongues are formed on the inner edges of the two strips into which the single board is formed, and the two strips are completely divided from each other before passing between the vertical grooving-heads 4 4, which groove the outer edges of the board, and is undoubtedly due to the varying force with which the different parts of the two strips are crowded together in passing between these vertical grooving-cutters, which causes them to cut at correspondingly different depths

into the edge of the strips in grooving them. In order to overcome this difficulty, we attach to the pressure-bar 40, on the feed-out side of cylinder 1 a plate 41, Figs. 3, 6, and 7, having a spline 42 on the lower face of this plate, which exactly corresponds with the cut of the cutters 2 2 of cylinder 1, and so prevents the two strips of the board from being crowded together while passing the grooving-cutters 4 4 and a consequent variation in the action of these cutters upon the outer edges of the two strips. The attachment of plate 41 to pressure-bar 40 is accomplished by means of an L-shaped upwardly-projecting part 43, attached to the plate 41, which has vertically-elongated holes 44 44, through which bolts 45 are passed, having nuts 46, securing the part 43 to the pressure-bar. These bolts 45 have their heads and shanks fitted into a long-shaped slot 47 in the presser-bar, which allows of their being adjusted horizontally with plate 41 to any desired position transversely of the machine to accommodate different widths of boards. This arrangement prevents the boards being cut of varying widths in the grooving operation, while allowing their being tongued and divided before reaching the grooving-cutters. The plate 41 also serves to hold the adjacent edges of the strips into which the board is formed down to the bed between the tonguing-cutters 4 4, and so prevent these edges from rising up and allowing the widths of the boards to be varied in that way while under the action of the grooving-cutters.

By arranging the cutter-head 5 and its attached parts so that it can be drawn out from the machine, as indicated in dotted lines in Fig. 4, we are enabled to adjust the cutters and sharpen them either on or off the head much more satisfactorily than would be possible if the head could not be drawn out, because the confined space over it and its hold-down fingers renders it almost inaccessible while in place in the machine.

The bed C of the machine extends under the cylinder 1, and the latter is adjusted up and down on guideways on the standards 75 in the usual manner. The pulleys 76 76 are attached to the shaft of this cylinder, and the pulley 77 is attached to the shaft of the under planing-cylinder 3, and these pulleys are belted from those on shaft B to drive the cylinders. The cylinder 1 and cutter-head 5, with its shaft 6, are both located between the feed-rolls F on the feed-in end of the machine and the vertical cutter-heads 4 4, which groove the outer edges of the lumber. Consequently the cutters 2 2 act more exactly in conjunction with each other than if those below the lumber were separated from those above by either the feed-roll or vertical side heads.

The solid platen 78 is attached to the frame of the machine in the usual manner above

the lower surfacing-cylinder 3 and sustains the lumber on its upper surface while being acted upon by it underneath.

What we claim as new and of our invention is—

1. The combination, in a wood-planing machine, of a single long planing-cylinder 1, provided with knives arranged for surfacing the lumber and cutters 2, arranged to form the upper portion of tongues upon the inner edges of two strips of board at the same time, a solid bed C beneath said cylinder 1, and the horizontal shaft 6, extending from one side of said bed transversely across below the path of the lumber and provided at its inner end with a set of cutters 2, adapted to operate in conjunction with the corresponding cutters of said cylinder 1, substantially as described.

2. The combination, in a wood-planing machine, of a single long planing-cylinder 1, provided with knives for surfacing the lumber and cutters 2, arranged to form the upper portion of tongues upon the inner edges of two strips of board at once, a solid bed C beneath said cylinder 1, a feed-roll F above said bed, and the horizontal shaft 6, extending transversely across below the path of the lumber between said feed-roll and cylinder 1 and provided with a set of cutters 2, adapted to operate in conjunction with the corresponding cutters of said cylinder 1, substantially as described.

3. The combination, in a wood-planing machine, of the feed-roller F above the bed, the vertical grooving cutter-heads 4 4, arranged to groove the outer edges of two strips of lumber at once, the single long planing-cylinder 1, provided with knives for surfacing the lumber and cutters 2, arranged to form the upper portion of tongues upon the inner edges of two strips of board at once, a solid bed C beneath the same, and the horizontal revolving shaft 6, extending transversely across below the path of the lumber and provided with a set of cutters 5, adapted to operate in conjunction with the corresponding cutters of said cylinder 1, said planing-cylinder 1 and shaft 6 being located and mounted adjacent to each other between said feed-roll F and said vertical grooving heads 4 4, substantially as described.

4. The combination, in a wood-planing machine, of the single long planing-cylinder 1, provided with knives for surfacing the lumber and cutters 2, arranged to form the upper portion of tongues upon the inner edges of two strips of board at once, a solid bed C beneath said cylinder 1, a presser-bar 20 on the feed-in side of the same, and the horizontal shaft 6, extending from one side of said bed transversely across below the path of the lumber, provided with a set of cutters 5 near its inner end, adapted to operate in conjunction with the corresponding cutters of cylinder 1, and with said shaft mounted upon plate 8, arranged to be adjusted independently of the upper cylinder 1 and its cutters 2 transversely of and entirely beneath the bed to bring the

cutters 5 of the shaft 6 and of planing-cylinder 1 into adjustment with each other, substantially as described.

5. The combination, in a wood-planing machine, of the single long planing-cylinder 1, provided with knives for surfacing the lumber and cutters 2, arranged to form the upper portion of tongues upon the inner edges of two strips of board at once, a solid bed C beneath said cylinder 1, the horizontal shaft 6, extending from one side of said bed across below the path of the lumber and provided with a set of cutters 5 near its inner end, adapted to operate in conjunction with the corresponding cutters of cylinder 1, and the plate 8, located beneath the path of the lumber, mounted on a guideway transversely of the frame and carrying said shaft 6, and arranged to be drawn out of said frame through one side thereof, substantially as described.

6. The combination, in a wood-planing machine, of the shaft 6, extending horizontally and transversely from one side of the machine-bed across beneath the path of the lumber through the machine and provided with cutters 2, for working the lumber, the plate 8, mounted on girt 9 and arranged to be adjusted lengthwise thereon, the girt 9, arranged in vertical guideways in the machine-frame and provided with adjusting-screws 16 16, bevel-gears 17 17 19 19, and horizontal adjusting-shaft 18, projecting at one end beyond the machine-frame and mounted therein, substantially as described.

7. The combination, in a wood-planing machine, of the single long planing-cylinder 1, provided with surfacing knives and cutters 2, arranged to form the upper portions of tongues upon the inner edges of two strips of board at once, a solid bed C beneath the same, the yielding pressure-bar 20 on the feed-in side of the same, the feed-roll F above said bed, the horizontal shaft 6, extending transversely across the frame beneath the path of the lumber, between said pressure-bar and feed-roll, and provided with a set of cutters 2, adapted to operate in conjunction with the corresponding cutters of cylinder 1, and a yielding pressure plate or finger 30, arranged to bear on the upper surface of the board opposite thereto and between said pressure-bar and feed-roll, substantially as described.

8. The combination, in a wood-planing machine, of the long planing-cylinder 1, provided with surfacing knives and cutters 2, its yielding pressure-bar 20, feed-roll F, arranged to bear on top of the lumber, a yielding pressure plate or finger 30, arranged to bear thereon between said pressure-bar and feed-roll and pivoted upon shaft 28, link 32, pivoted lever 33, connected thereby to said finger 30 and extending horizontally above said feed-roll, and the shaft 6, provided with cutters 5, arranged to operate on the undersurface of the lumber beneath said pressure-finger 30 and in conjunction with the corresponding cutters on cylinder 1, substantially as described.

9. The combination, in a wood-planing machine, of the long planing-cylinder 1, provided with knives arranged for surfacing the lumber and cutters 2, arranged to form the upper portion of tongues upon the inner edges of two strips of board at once, a solid bed C beneath said cylinder, the horizontal shaft 6, extending from one side of said bed transversely across below the path of the lumber and provided with cutters 2, adapted to operate in conjunction with the corresponding cutters of cylinder 1, and the under surfacing-cylinder located toward the feed-out end of the machine from shaft 6 and arranged to dress the lower face of the lumber after it has passed the cutters of said shaft, substantially as described.

10. The combination, in a wood-planing machine, of cutter heads or cylinders 1 and 5, attached on horizontal shafts above and below the path of the board through the machine, and provided with cutters 2 5, adapted to tongue and divide a board into two strips at a single operation, the vertical cutter-heads 4 4, placed on the feed-out side of said horizontal cutter-heads and adapted to groove the outer edges of said strips, and the supporting-bar 42, arranged to enter between said

strips opposite to said vertical heads and sustain said strips in the same relation to each other throughout their length while being so grooved on their outer edges, substantially as described.

11. The combination, in a wood-planing machine, of cutter heads or cylinders 1 and 5, attached on horizontal shafts above and below the path of the board through the machine and provided with cutters 2 2, adapted to tongue and divide a board into two strips at a single operation, the vertical cutter-heads 4 4, placed on the feed-out side of said horizontal cutter-heads and adapted to groove the outer edges of said strips, and the supporting-bar 42, arranged to enter between said strips opposite to said vertical heads and also bear upon the upper surfaces of the same and sustain said strips in the same relation to each other throughout their length while being so grooved on their outer edges, substantially as described.

SOLOMON A. WOODS.
JOHN R. THOMAS.

Witnesses;

DAVID HALL RICE,
N. P. OCKINGTON.