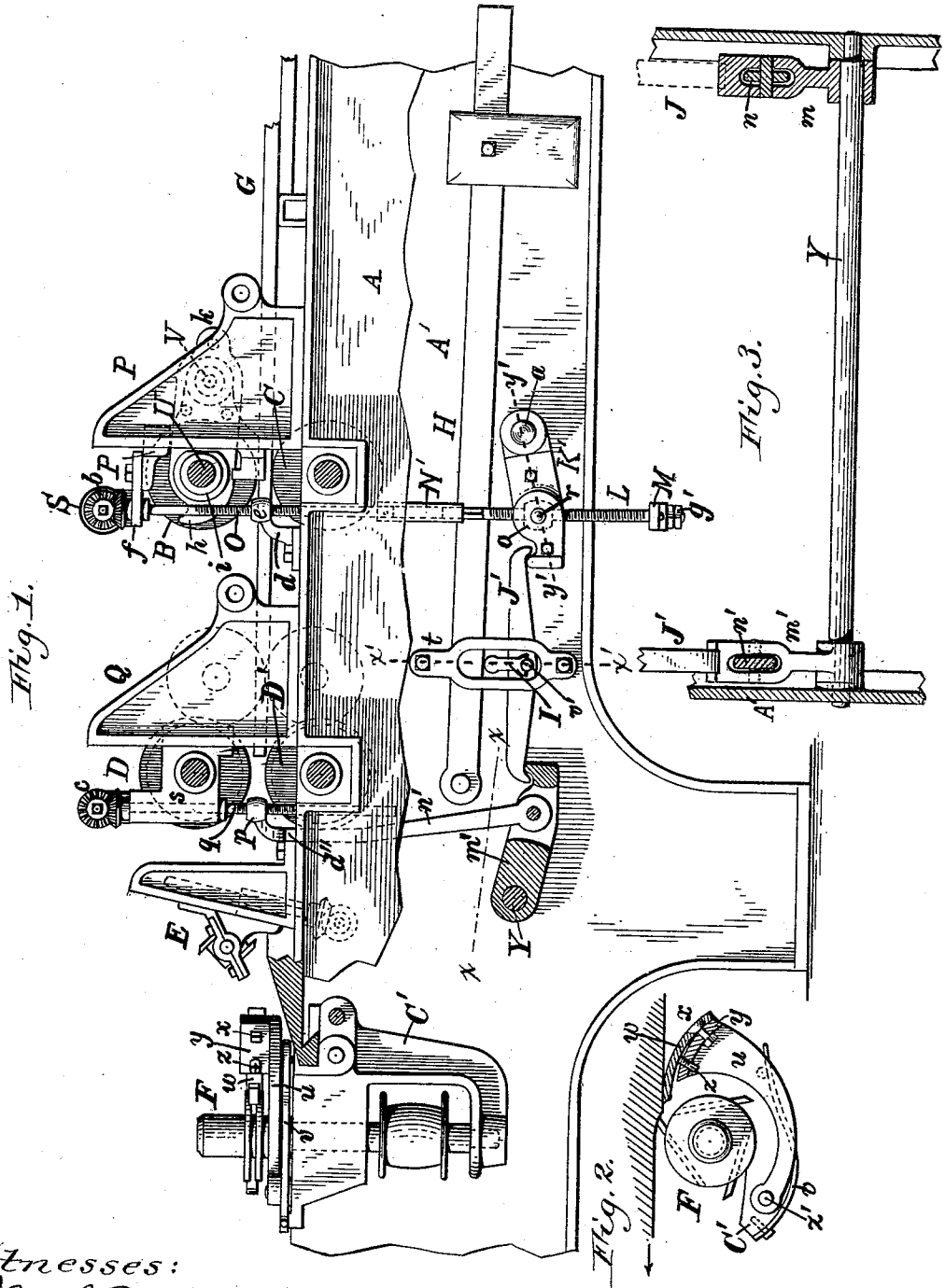
(No Model.)

2 Sheets—Sheet 1.

J. S. GRAHAM.

PLANING MACHINE.

No. 508,516. Patented Nov. 14, 1893.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

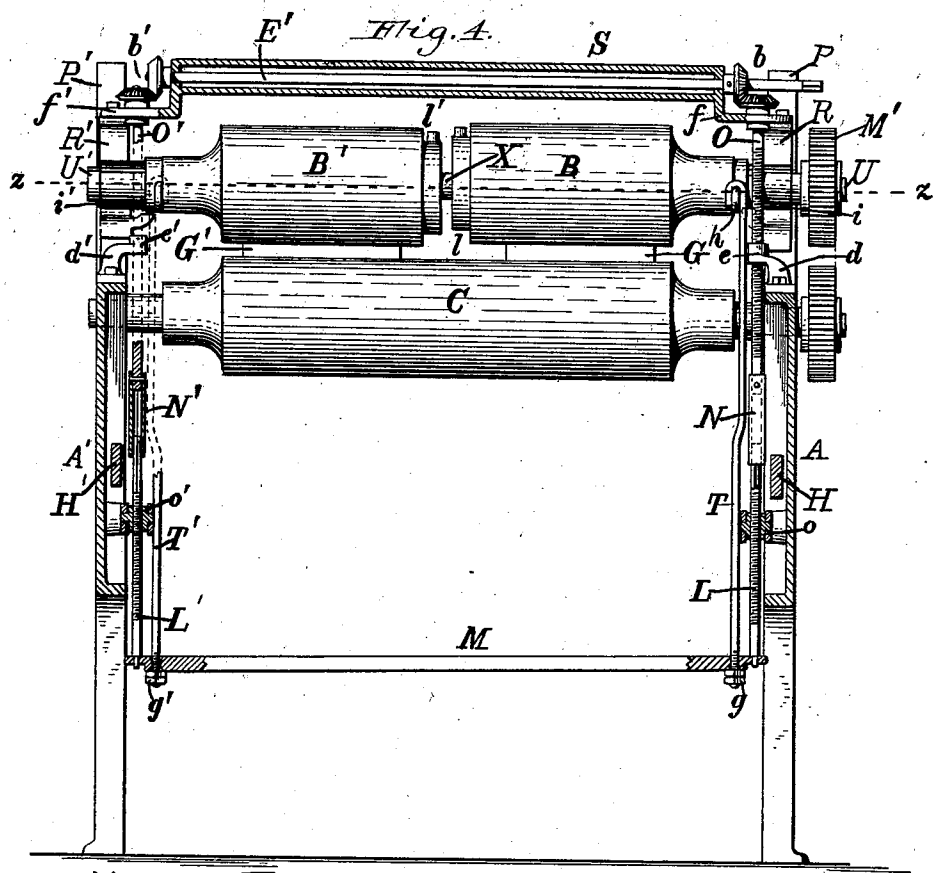

Fig. 5.

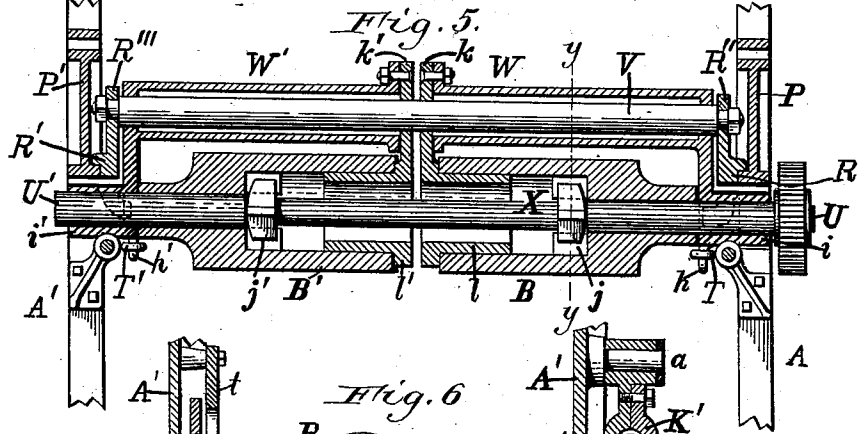

Fig. 7.

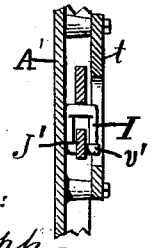

Fig. 6.

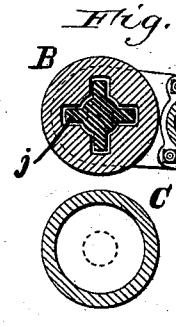

Fig. 8.

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UNITED STATES PATENT OFFICE.

JAMES S. GRAHAM, OF ROCHESTER, NEW YORK, ASSIGNOR TO THE JAMES S. GRAHAM & COMPANY, OF SAME PLACE.

PLANING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 508,516, dated November 14, 1893.

Application filed May 15, 1889. Serial No. 310,845. (No model.)

To all whom it may concern:

Be it known that I, JAMES S. GRAHAM, a citizen of the United States, residing at Rochester, in the county of Monroe, in the State of New York, have invented certain Improvements in Planing-Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to certain improvements in planing machines, which improvements are fully described and illustrated in the following specification and accompanying drawings, and the novel features thereof specified in the claims annexed to the said specification.

My improvements in the planing machines are represented in the accompanying drawings, in which—

Figure 1 is a side elevation,—a portion of the frame nearest the observer being broken away to show the lifting mechanism. Fig. 2 is a plan view of one of the side or matching cutter-heads, showing the adjustable chip-breaker. Fig. 3 is a section on line *x x*, Fig. 1, showing the parts below that line. Fig. 4 is a transverse section of the machine showing the divided roll and its attachments. Fig. 5 is a horizontal longitudinal section through the divided roll on the line *z z*, Fig. 4. Fig. 6 is a transverse section of the divided feed roll on the line *y y*, Fig. 5. Fig. 7 is a section on the line *x' x'*, Fig. 1. Fig. 8 is a section on the line *y' y'*, Fig. 1.

In the accompanying drawings representing my improvements in planing machines, A A' are the side frames of the machine, B B' the divided feed roll, C the stationary or lower feed roll, D D' the second set of feed rolls, E the main cutter head and F one of the matching or side cutters. The side frames are connected together in any usual way and the cutters and feeding rolls are driven from the main shaft of the machine in any usual or preferred manner. The feed rolls are provided with the usual expansion gearing, by which provision is made for driving the upper rolls while feeding lumber of different thicknesses through the machine.

Referring to the construction of the divided feed rolls in my improved planing machine, the lower or stationary roll C is supported on a shaft revolving in suitable boxes on the frame of the machine, and driven in any ordinary way. The upper or divided feed roll B B' is driven from the lower one by expansion gearing. The divided rolls are connected together by the shaft X, Figs. 4 and 5, which permits the rolls to rise independently of each other, so as to adapt the machine to feeding simultaneously two boards of different thicknesses, G G', Fig. 4, as indicated in the drawings. The feed roll B is provided with a shaft U passing through the box *i*.

On the opposite side of the machine, the feed roll B' is provided with a shaft U' revolving in the box *i'*. The box *i* is connected with a journal or bearing *l*, Fig. 5, at the inner end of the roll B by means of the connection W which, in this case is represented as a sleeve surrounding the shaft V, which connects the frame work of one of the rolls B, with a corresponding frame work for the other roll B'. The box *i* and the journal *l* and the connecting parts are free to turn about the shaft V, so that the roll B can rise or fall independently of the roll B'. In a similar manner the box *i'* and journal *l'* of the roll B' are connected together by the arm *k'* and sleeve W' in such a manner that the roll B' can rise and fall by swinging about the shaft V as an axis independently of the other roll. The ends of the shaft V are supported in arms R'' R''' connected with the sliding brackets R R' which are arranged to move up and down on the standards P P' attached to the side frame of the machine. The brackets R R' are gibbed or otherwise attached to projecting flanges on the standards P P'. The brackets R R', by means of the screws O O', adapt the rolls for any desired thickness of lumber. The rolls are caused to press on the lumber, by suitable connections with the weighted lever H, Fig. 1, which connections are hereinafter described. The ends of the shaft V are secured in the arms R'' R''' by suitable devices. The sleeves W W' may be cast in one piece with the boxes *i i'*, or they may be attached to arms secured to the boxes. At their inner ends, the sleeves or connecting bars W W' are fastened to the arms *k k'*, which support the journals *l l'* at the inner ends of the divided rolls. As in-

dicated in the drawings, the journals *l l'* are cylindrical in form and fitted to the interior of the inner ends of the divided rolls B B', but it is obvious that the rolls might be supported by journals of any other preferred form. Thus the journals *l l'* might encircle the ends of the rolls. The connecting shaft X, by which the roll B' is driven from the roll B, is provided on each end with a universal joint which permits the rolls to move independently of each other.

In the construction shown in the drawings, the shaft X is provided with the heads *j j'*, having two or more radial arms which fit into corresponding recesses formed in the interior of the rolls B B' as indicated in Fig. 6. The shafts and heads *j j'* may be forged in one piece, or the heads may be formed separately and attached to the shaft. When the journals *l l'* are placed inside the feed rolls, they should be hollow or provided with an opening sufficiently large to permit the insertion of the heads *j j'* through them. The boxes *i i'* are provided with hooks or lugs *h h'* to which the upper ends of the rods T T', Figs. 4 and 5, are attached. The lower ends of the rods T T' are connected together by the cross-bar M; the outer ends of the bar M are attached to the lower ends of the screws L L' which pass through the swivel nuts *o o'*, which are forced downward, either directly or indirectly, by the weighted lever H H'.

In the construction shown in the drawings, the pressure of the weights on the levers H H' is transmitted through the stirrup I to the equalizing bar J', Fig. 1, which bears at one end on the lever K' carrying the swivel nut *o*, and at the other end is connected with the mechanism for holding down the feed roll D. The lever K' is pivoted on a stud *a* inserted in the side frame of the machine. The lever K' is made in two parts, fastened together so as to permit the insertion of the swivel nut *o* between them. The trunnions *r r'* of the nuts fit openings in the two parts of the lever as indicated most clearly in Fig. 8. The brackets R R' are provided with the arms *f f'*, through which the upper adjusting screws O O' pass. Provision is made for causing the adjusting screws O O' to revolve simultaneously by means of the bevel gears *b b'* and the horizontal connecting shaft E', Fig. 4. The brackets R R' are connected together by the arms *f f'* and sleeve or connecting bar S, Fig. 4.

In the construction shown in the drawings, the shaft E' passes through the sleeve S. Below the arms *f f'* the screws O O' are provided with collars. The screws O O' pass through stationary nuts *e e'* fixed either direct to the frame of the machine or supported thereon by means of the arms *d d'*. By turning the shaft E', by means of a suitable handle or crank the screws O O', by means of the bevel gears *b b'* are caused to revolve simultaneously, thus raising or lowering the divided rolls B B' to adapt the machine to different thicknesses of lumber. At their lower ends the screws O O' are connected with the screws L L' by means which cause the upper and lower screws to revolve simultaneously while permitting them to shift lengthwise relatively to each other. Any suitable device may be used for this purpose. In the construction shown in the drawings, the upper ends of the screws L L' are squared and fitted to the interior of the sleeves N N' which are pinned or otherwise secured to the lower ends of the screws O O', so that they are caused to revolve therewith. The upper ends of the screws L L' slide in the sleeves N N'. When the roll B rises, it lifts the rod T and also the screw L and the weighted lever H connected thereto,—the upper end of the screw L sliding in the sleeve F. The screws O O' are made of the same pitch as the screws L L', and the object of using the screws L L' is to maintain a constant relation between the nuts *o o'* and the points where the rods T T' are attached to the boxes *i i'* as shown at *h h'*. A corresponding, but independent operation, takes place on the other side of the machine, when the roll B' rises.

Various means may be employed for causing the rod T to exert a direct upward force on the screw L. Thus guides may be attached to the side frame for this purpose, but I prefer to use the cross bar M represented in Fig. 4, to which the lower ends of the rods T T' are secured by the nuts *g g'*, or other suitable devices. The holes in the cross bar through which the rods T T' and the screws L L' pass, are made sufficiently large to permit one end of the cross bar to rise independently of the other, as indicated in Fig. 4. When the roll B rises it is maintained in a position parallel to the lower roll C or the bed of the machine by the connections between the box *i* and the journal *l*, which connections must be made strong enough to stand the requisite strain and to transmit, while swinging about the shaft V, the downward pull of the rod T on the box *i* to the journal *l*.

In order to reduce the friction and wear between lever H and equalizing bar J', I employ a stirrup I, Fig. 7, the two arms of which embrace the bar J' and rest on the trunnions pressing forward on the sides of the bar J'. Provision is made for holding down the feed roll D by means of the adjusting screw *q*, nut *p*, and connections *n'* attached to the arms *m m'*, connected together by the rock-shaft Y. The screws *q q* pass through the boxes which support the ends of the shaft of the roll D. The screws *q* are caused to revolve simultaneously by means of the bevel gear C connected together by a horizontal shaft. At their upper ends the connections *n n'* are provided with nuts *p* through which the screws *q* pass; at the lower ends the connections *n n'* are pivoted to the arms *m m'*, which are rigidly secured to the rock shaft Y, journaled in suitable bearings in the side frames of the machine. The free ends of the

arms m are held downward by engagement with the ends of the bar J'. The weight may however, in certain forms of construction be applied directly to the arms $m\,m'$, which would be extended outward for this purpose.

The object of the construction described including the rock shaft Y, is to keep the roll D parallel with the bed of the machine during its up and down movements, and also to permit of its adjustment relative to the lower roll D', to adapt the machine to plane different thicknesses of lumber. Suitable stops are provided to limit the downward movement of the roll D and to sustain it in the position to which it is adjusted. Such stops may be attached to the frame of the machine underneath the arms $m\,m'$, but I prefer to attach the stops to the connections $n\,n'$ as indicated at d'' in Fig. 1,—these stops d'' resting upon the frame of the machine at all times, except when the roll D is raised by the lumber passing under it. By placing the stop d'' on the connections n', I provide for automatically taking up any lost motion in any of the joints in the train of mechanism which transmits the force of the weight on the lever H to feed roll D. The journal boxes s of the feed roll D are supported by suitable standards Q, Fig. 1. An endless bed feed mechanism may be substituted for the lower rolls C' D', or either of these rolls, in my improved planing machine. In the case of the substitution of an endless bed or an adjustable lower roll, such as used in pony planers for the lower feed roll C, the supporting shaft V would be connected at its ends directly to the side frames of the machine.

In order to increase the durability of the chip-breaker used in connection with the matching or side cutter F, I employ the adjustable plate w, Fig. 2. The arm u of the chip breaker is pivoted at z', to the bracket C', which supports the cutter of the matching spindle. The arm is pressed against the lumber by the spring v. The wearing plate w is given a suitable curved form, as represented in the drawings, and it is attached to the flange y on the free end of the arm u by means of a bolt x, having a hemispherical head fitting a recess of corresponding shape in the wearing-plate.

z is an adjusting screw by which the outer face of the wearing-plate may be advanced to its proper position as fast as it wears away. The rounded shape of the head of the bolt x permits of the adjustment of the wearing plate without twisting it out of shape, or bending the bolt x.

I claim—

1. The combination with the divided feed-rolls of a planing-machine, of the driving shaft X, located within the open ended rolls and connected thereto at its ends by universal joints, whereby one of the divided rolls is driven from the other while they are permitted to rise and fall independently of each other substantially as described.

2. The combination in a planing machine, of the divided rolls B B', supporting shaft V, connections, W W', boxes $i\,i'$, arms $k\,k'$, journals $l\,l'$, and driving shaft X, whereby one of the divided rolls is driven from the other, substantially as described.

3. The combination with the divided feed rolls of a planing machine, of the driving shaft X, provided with heads $j\,j'$, constituting universal joints at each end of the driving shaft, whereby one of the divided rolls is driven from the other, while they are permitted to rise and fall independently of each other substantially as described.

4. The combination, in a planing machine, of the divided rolls, B B', supporting shaft V, connections W W', boxes $i\,i'$, arms $k\,k'$, journals $l\,l'$, and the sliding brackets R R', sustaining the ends of the shaft V, substantially as described.

5. The combination, in a planing machine, of the divided rolls, B B', supporting shaft V, sliding brackets R R', for sustaining the ends of the shaft, and suitable connecting mechanism between the supporting shaft and the divided rolls, whereby the rolls are allowed to adjust themselves independently of each other while their parallelism is maintained, substantially as described.

6. The combination in a planing machine with the divided rolls B B' adapted to rise and fall independently while revolving, of the brackets R R', the adjusting screws O O', and fixed nuts $e\,e'$ attached to the frame of the machine, substantially as described.

7. The combination, in a planing machine, of the divided rolls B B', adapted to rise and fall independently of each other while revolving, adjusting screws O O', fixed nuts $e\,e'$, attached to the frame of the machine, supporting shaft V, sliding brackets R R' and mechanism for sustaining the rolls and connecting them with the shaft V, substantially as described.

8. The combination with the divided rolls of a planing machine, of the adjusting screws O O', fixed nuts $e\,e'$, screws L L', and sleeves N N', whereby the screws are caused to revolve together while permitted to move endwise, substantially as described.

9. The combination with the upper feeding roll of a planing machine, of the adjusting screws O O', fixed nuts $e\,e'$, screws L L', sleeves N N', whereby the screws are caused to revolve together while permitted to move endwise, weighted levers H and mechanism for connecting the lever with the lower screws L L' substantially as described.

10. The combination in a planing machine, of the divided rolls B B', boxes $i\,i'$, rods T T', cross-bar M connecting the lower ends of the

rods screws L L′ bearing on the cross-bar at their lower ends, and the weighted levers H, H′, substantially as described.

11. The combination in a planing machine, of the divided rolls B B′, boxes *i i′*, adjusting screws O O′, fixed nuts *e e′*, screws L L′, sleeves N N′ and rods T T′, attached to the boxes *i i′*, at their upper ends and connected to the lower screws L L′ at their lower ends, substantially as described.

12. The combination with the movable feed-roll D, of the adjusting screws *q*, connections *n′*, provided with nuts *p* at their upper ends and pivoted at their lower ends to the arms *m′* on the rock-shaft, substantially as described.

13. The combination, with the movable feed-roll D, of the adjusting screws *q*, connections *n′*, provided with nuts *p* at their upper ends and pivoted at their lower ends to the arms *m′* on the rock shaft Y, and suitable stops for arresting the downward movements of the roll, substantially as described.

14. The combination in a planing machine of the driving gear M′, the rolls B B′, the driving shaft X fitted with a universal joint, and the hollow bearings *l l′*, substantially as described.

15. The combination in a planing machine, of the screw L, the lever K and the double trunnioned nut *o* connected with the upper feed rolls by suitable mechanism, substantially as described.

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