(No Model.)

3 Sheets—Sheet 1.

L. P. HOYT.

PLANING MACHINE.

No. 384,445. Patented June 12, 1888.

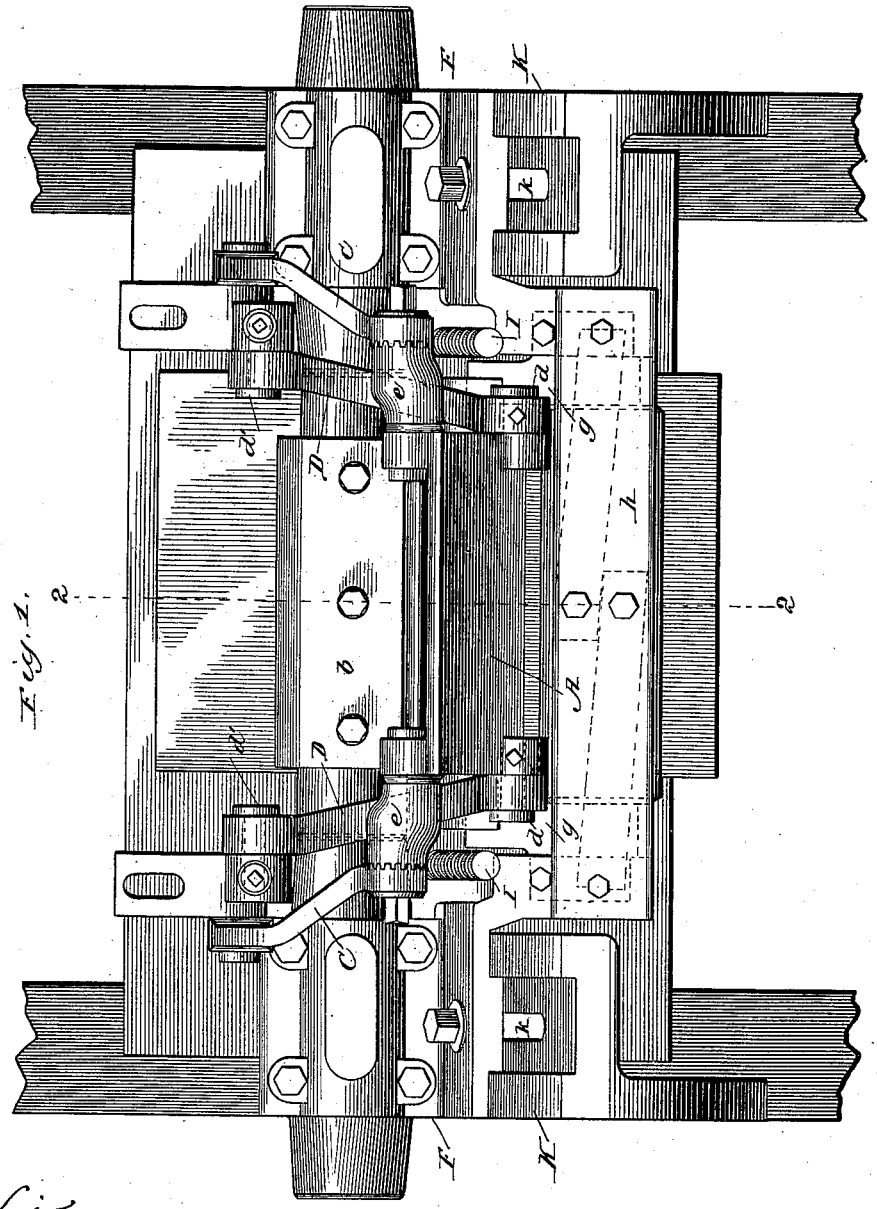

Fig. 1.

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PLANING MACHINE.

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Fig. 2.

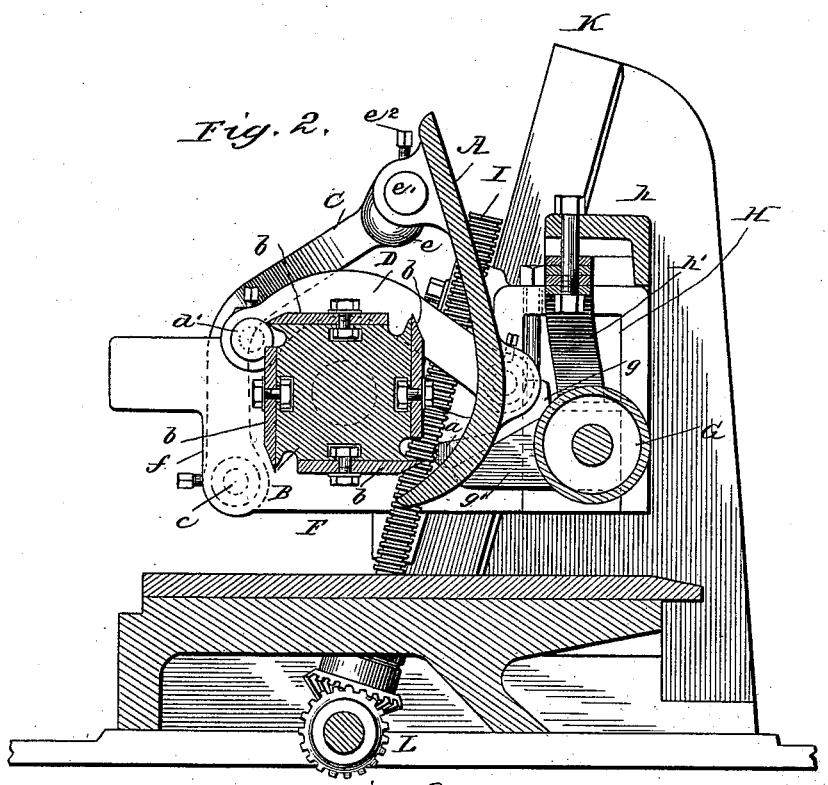
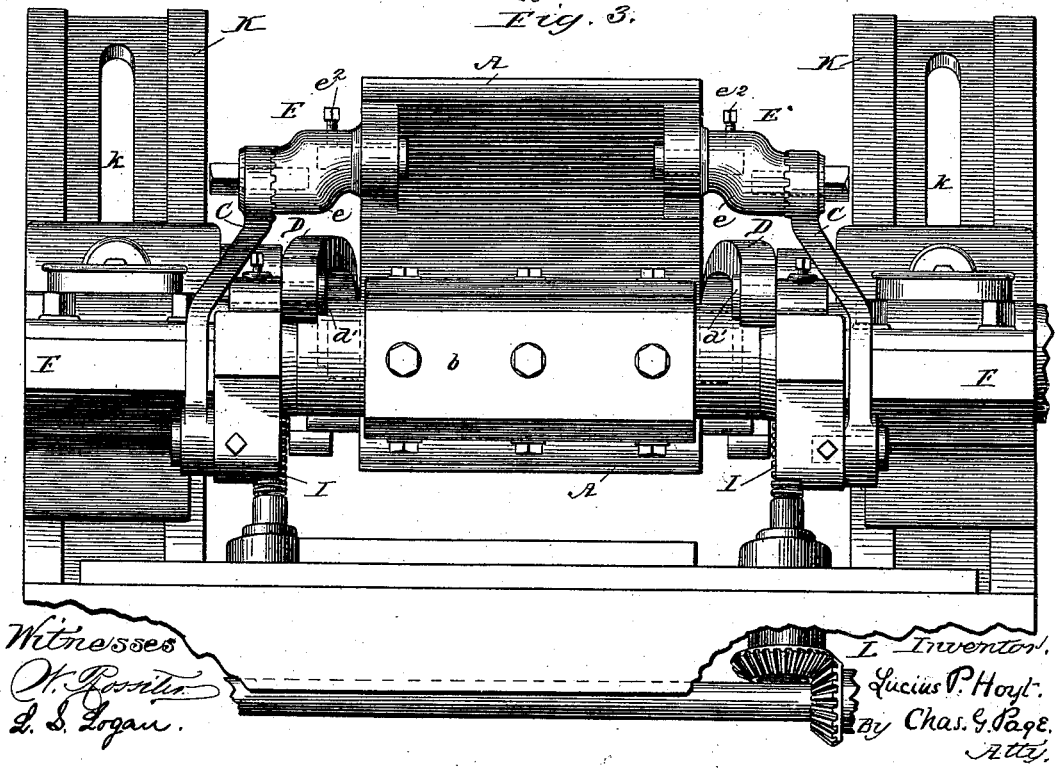


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 4.

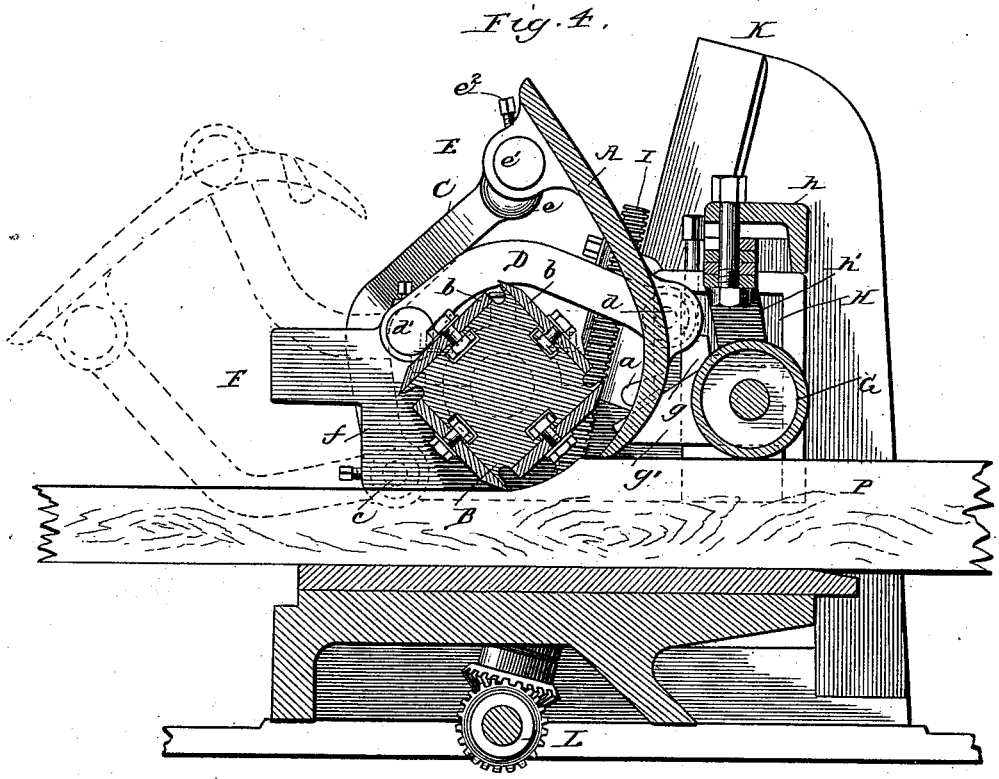


Fig. 6.

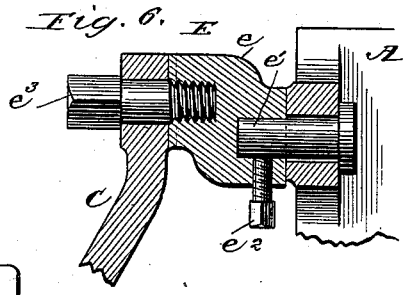


Fig. 5.

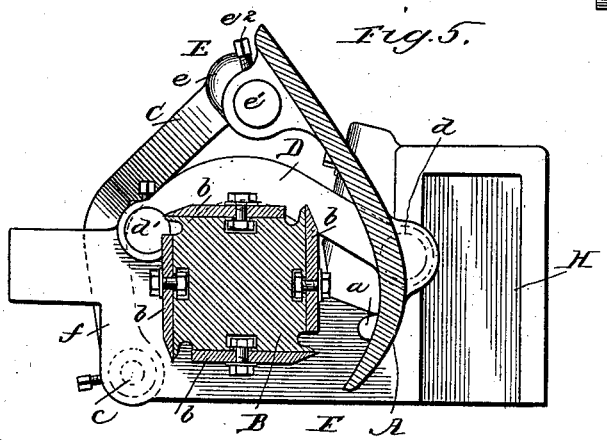


Fig. 7.

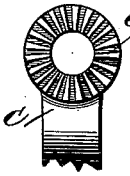
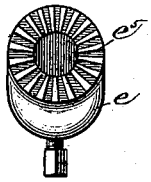


Fig. 8.



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UNITED STATES PATENT OFFICE.

LUCIUS P. HOYT, OF AURORA, ILLINOIS.

PLANING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 384,445, dated June 12, 1888.

Application filed January 31, 1888. Serial No. 262,511. (No model.)

To all whom it may concern:

Be it known that I, LUCIUS P. HOYT, a citizen of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented a certain new and useful Improvement in Planing-Machines, of which the following is a specification.

This invention relates to that part of a planing or surfacing machine commonly known as the "chip-breaker," and usually stationed in advance of the line of cut made by the knives or cutters of the usual horizontally-arranged rotary cutter-head or cutter-cylinder with a view to effect the breaking off of the chips.

The more prominent objects of my invention are, first, to maintain the chip-breaker, or such portion thereof as may be next adjacent to the rotary cutter-head or cutter-cylinder, substantially concentric with the cutting-circle or circular path described by the cutters during both the rise and fall of the chip-breaker, whereby, in order to effectively break off the chips, the chip-breaker, regardless of the thickness of the lumber that is being operated upon, may be brought in close proximity to the line of cut without running into the cutter-cylinder; secondly, to permit the lower or toe portion of the chip-breaker to be brought exceedingly close to the line of cut, regardless of the thickness of the lumber, and at the same time to prevent the sudden thrust of an incoming piece of lumber against the chip-breaker from forcing the same against the cutters of the rotary cutter-cylinder; thirdly, to permit the chip-breaker to be readily swung out of the way when it may be found desirable to remove the cutter-cylinder; fourthly, to readily increase or decrease the clearance-space between the line of cut and the toe of the chip-breaker, and also to increase or decrease the distance between such portion of the chip-breaker and the rotary cutter-cylinder with reference to the extent to which the cutters may project from the latter; fifthly, to permit the vertical bodily rise of the presser-roll occasioned by the passage of the incoming lumber under the same, to lift the chip-breaker in the arc of a circle substantially concentric with the cutting-circle of the cutter-cylinder, and to an extent to permit the incoming lumber to readily engage under and lift the chip-breaker into position to permit it to bear with its full weight upon the lumber; and, finally, to provide certain novel and improved details, all tending to the general efficiency of this portion of a planing or surfacing machine.

To the attainment of the foregoing and other useful ends my invention consists in matters hereinafter described, and particularly pointed out in the claims.

In accordance with the spirit of my invention, the chip-breaker during both its rise and fall is caused to move in a path proximately or substantially concentric with the cutting-circle described by the knives or cutters of the rotary cutter-head or cutter-cylinder usually employed in planing or surfacing machines, so that the during the rise and fall of the chip-breaker its toe portion shall move in the arc of a circle substantially concentric with the cutting-circle. The rising movement of the chip-breaker is not, however, limited to the highest point at which it may be raised by the thickest piece of lumber that can practically be run through a planing or surfacing machine, and, to the contrary, the chip-breaker can be raised not only to a height to bring it above the cutter-cylinder, but also carried from such elevated position rearwardly—that is to say, toward the delivery end of the machine. To such end the chip-breaker is attached to swinging arms, which during the rise and fall of the chip-breaker control its position relatively to the cutting-circle and cause it to move in a path substantially concentric thereto, in which way the lower portion or toe of the chip-breaker can at all times be kept close to, but practically equidistant from, the cutting-circle, and hence be brought close to the line of cut, regardless of the thickness of the incoming lumber, which necessarily determines the height to which the chip-breaker is raised. Said swinging arms are hung or fulcrumed at the rear of the cutter-cylinder—that is to say, between the cutter-cylinder and the delivery end of the machine—and are arranged to extend forwardly and over the axis of the cutter-cylinder, so as to normally place the chip-breaker in working position in front of the cutter-cylinder, but permit the chip-breaker to be raised from such point and swung over to the rear of the cutter-cylinder, so as to leave a clear field about the latter. When the cutter-cylinder is in working position in front

of the cylinder, the arms which are hung at the opposite rear side of the cutter-cylinder will extend forwardly in opposition to the thrust of the incoming lumber against the chip-breaker, thereby effectively bracing the latter and avoiding all possibility of its being accidentally forced against the cutters, and at the same time permitting the chip-breaker to freely rise and fall. The chip-breaker can also be adjusted so as to provide more or less clearance-space between the chip-breaker and the cutter-cylinder, thereby particularly providing for the employment of knives projecting to a greater or less extent from the rotary cutter-cylinder.

Provision is made whereby, when the presser-roll is raised in a vertical plane by the incoming lumber, the chip-breaker will be lifted in the arc of a circle substantially concentric with the cutting-circle by reason of such rise on the part of the presser-roll, the toe or lower portion of the chip-breaker being, however, permitted to extend somewhat below the lowest lever of the presser-roll, so that when the incoming lumber reaches the chip-breaker it can engage and readily lift the chip-breaker to an extent to permit the full weight of the chip-breaker to rest upon the lumber.

In the drawings, wherein devices embodying the principles of my invention are represented, I have shown only so much of a planing or surfacing machine as may be necessary to the understanding of my invention, which can be applied to a great variety of planing or surfacing machines.

Figure 1 of the drawings represents a top plan view of the chip-breaker and its adjuncts in connection with such portion of the planing or surfacing machine as may be within the immediate vicinity of the chip-breaker. Fig. 2 represents a vertical section taken on a plane indicated by line 2 2, Fig. 1, the chip-breaker in this figure being in its lowest position. Fig. 3 represents the same in elevation, looking from the rear or delivery end of the machine. Fig. 4 is a sectional elevation similar to Fig. 2, but representing a piece of lumber, P, in the act of passing through the machine, whereby the chip-breaker is raised from its position shown in Fig. 2. Fig. 5 is a vertical section taken through the rotary cutter-cylinder and chip-breaker on the plane of the preceding figure, and represents in elevation one of the cutter-cylinder boxes provided with a guide or housing for one of the presser-roll boxes. In this view an adjustable eccentric connection between the chip-breaker and arm C has been adjusted so as to throw the lower portion of the chip-breaker somewhat farther from the cutter-cylinder than is shown in Fig. 4. Fig. 6 is a detail view principally representing a section taken through the adjustable eccentric connection between the chip-breaker and one of the swinging arms C. Fig. 7 represents a toothed face upon the upper end of arm C, and Fig. 8 represents a similar toothed face upon one end of the crank or eccentric block *c*, said figures being details in further illustration of the device of Fig. 6.

In said drawings, A indicates the chip-breaker, and B denotes a horizontally-arranged rotary cutter-head or cutter-cylinder, which may be of any ordinary or suitable construction, and which is herein understood to be adapted for planing or dressing down boards or lumber in a planing or surfacing machine in the usual way.

The direction in which the chip breaker is to move during both its rise and fall is determined by swinging arms or links which serve to maintain the chip-breaker in a path proximately concentric with the cutting-circle—that is to say, in a path proximately concentric with the circular path described by the cutting-edges of the knives or cutters *b* of the rotary cutter-cylinder, in which way the toe or lowest edge portion of the chip-breaker, which is to rest upon the lumber, may during both the rise or fall of the chip-breaker be maintained substantially equidistant from the cutting-circle.

The arms or links herein provided for guiding the chip breaker and determining its position relatively to the rotary cutter-cylinder are conveniently separated into two sets or pairs in order that one pair can be applied at each end of the chip-breaker, which is understood to extend transversely across the line of feed. Each pair of these said arms comprises an arm C and an arm D, the arrangement and functions of the arms of one pair being similar to the arrangement and functions of the arms of the other pair, it being observed that the employment of two pairs of such arms respectively at opposite ends of the chip-breaker serves to more accurately and effectively guide and steady the same. A description of the action of one pair of said arms will therefore serve for both pairs, and to such end particular reference is first made to Figs. 2, 4, and 5, each representing a section taken on a vertical plane through the chip-breaker, with arms C and D in elevation. The arm C, which is the longer of the two arms, is pivotally connected with the upper portion of the chip-breaker, while the shorter arm, D, is pivotally connected with the chip-breaker at a point lower down.

The pivotal or fulcral supports for said arms are herein shown eccentric to the axis of the cutter cylinder and to one side of the same, (see also Figs. 1 and 3,) and the arms are also somewhat bent, so that they may extend over the cutter-head, so as to permit the chip-breaker when in use to be positioned at one side of the cutter-cylinder, while the arms are fulcrumed at the opposite side thereof. The pivotal support for the arm D is also eccentric to and somewhat higher than the pivotal support for the arm C, in which way the two arms are adapted to swing about centers eccentric to the axis of the cutter-cylinder and eccentric to one another. When the chip-breaker is either raised or permitted to drop, it will, as

a resultant of the compound or conjoint action of the separately-fulcrumed swinging arms, be caused to move in a path proximately concentric with the cutting-circle, and under any and all circumstances will be prevented from running into the cutters of the rotary cutter-cylinder. In this way the toe of the chip-breaker may with safety be brought close to the line of cut and the breaking off of the chips insured, regardless of the thickness of the lumber and the consequent height the chip-breaker is caused to assume. By thus connecting the chip-breaker with the swinging arms or links C and D it is in effect capable of a bodily swing in a path about the rotary cutter-cylinder, while at the same time, by reason of the eccentric disposition of the pivots for such arms and their connection with the chip-breaker, the latter will turn about the pivots by which it is connected to the arms in such a way as to cause it to generally follow a proximately circular path, and particularly to keep its lower portion proximately concentric with the cutting-circle.

In Fig. 2 the chip-breaker is shown in a lowered position, with its lowest portion or toe somewhat under the cutter-cylinder. In Fig. 4 the chip-breaker is shown lifted to some extent from the aforesaid position and resting upon a piece of lumber; but in both of said two positions the toe of the chip-breaker is for all practical purposes at one and the same distance from the path described by the cutters or "cutting-circle," as it has hereinbefore been termed.

The chip-breaker may also be raised and thrown back out of the way, as in dotted lines, Fig. 4, wherein the chip-breaker, when thus thrown back, is represented as having somewhat departed from its former position relatively to the cutting-circle, which result is desirable, since, when the chip-breaker has been thus raised and thrown to the rear of the cutter-cylinder, ample room is afforded for removing the latter.

It will be obvious that the exact curvature of the line followed by the chip-breaker in being thus raised and swung to the rear of the cutter-cylinder will depend upon the relative lengths of the arms and the relative positions of the centers about which they are arranged to swing. With reference, however, to the size of the cutter-cylinder and the desired path described by the chip-breaker relatively to the same, the disposition of such arms and their pivots may be readily calculated and determined.

As a means for varying the position of the toe of the chip-breaker relatively to the cutter-cylinder, in order to either determine its proper position with reference to sets of cutters projecting to a greater or less extent from the cutter-cylinder or to insure greater or less space between the toe of the chip-breaker and the cutting-circle, whereby more or less clearance may be had between the chip-breaker and the cutters, various mechanical adjusting devices can be employed for attaining the effect of lengthening or shortening either of the arms C and D, or adjusting their pivots so as to vary the distance between the toe of the chip-breaker and the cutter-cylinder, it being, however, exceedingly convenient and practicable to provide means for adjusting the pivotal connection between the chip-breaker and the arm C, so as to vary the distance between such pivotal connection and the center about which the arm is arranged to swing.

As an illustration of one of various mechanical adjusting devices which could be employed for such purpose, the arm C and the chip-breaker A are connected by an adjustable eccentric, E, (best shown in Figs. 6, 7, and 8,) and therein consisting of a crank-shaped block or bearing, *e*, connected at one end with the chip-breaker by a pivot, *e'*, and at its opposite end rigidly but adjustably connected with the arm C. The pivot *e'* is more conveniently held in rigid connection with the block *e* by a bolt, e^2, and the arm C is held clamped against said bearing by a bolt, e^3. In order to prevent a slip between the arm and said block or bearing, the arm is provided with a toothed face, e^4, Fig. 7, and the block or bearing *e* is provided at one end with a similar toothed face, e^5. The teeth of these two faces interlock when the arm is secured to the block or bearing, thereby preventing slip. By loosening bolt e^3 the block *e* can be turned independently of the arm, thereby practically adjusting the pivotal connection between the arm and chip-breaker, as illustrated by a comparison of Fig. 4 with Fig. 5, in the former of which the eccentric is set for keeping the toe portion of the chip-breaker close to the cutting-circle, while in Fig. 5 the eccentric is set to keep such portion of the chip-breaker at a somewhat greater distance from the cutting-circle in order to give greater clearance between the chip-breaker and the cutters.

It will be obvious that the adjustment attained by the foregoing-described adjusting device is substantially the same as though, in place of adjusting such adjuncts of the arms C, the arms D or their pivots should be adjusted in any suitable way to set the toe of the chip-breaker farther away from or nearer to the cutter-cylinder.

By referring to Figs. 1 and 3 it will be seen that the arrangement of arms and eccentric hereinbefore described is in said figures duplicated, whereby a pair of arms, C and D, may be applied at each end of the chip-breaker, the arms C being connected with the chip-breaker by adjustable pivotal connections such as hereinbefore described, and the arms D being connected with the chip-breaker by pivots *d*.

The adjustable boxes F for the cutter-cylinder are desirably provided with bearings *f*, both for the pivots *e* of arms C and for the pivots *d'* of arms D, whereby the pivotal supports for the arms can be raised and lowered in correspondence with the adjustment in height of

the cutter-cylinder. The lower portion of the chip-breaker is curved somewhat in correspondence with the cutting-circle, whereby it may, when desired, be brought to some extent under the cutter-cylinder. This configuration of chip-breaker also permits an effective arrangement of the chip-breaker relatively to the cutter-cylinder and arms, and avoids unnecessary prolongation of the arms C, for the reason that when the chip-breaker is in working position its upper portion can overhang to some extent the cutter-cylinder.

G indicates a presser-roll arranged in advance of the chip breaker and serving to hold down the lumber, in which respect it subserves the purpose for which presser-rolls are commonly employed in planing or surfacing machines.

The boxes or bearings *g* for the presser-roll are herein partially represented, but are understood to be ordinary vertical sliding boxes or bearings adapted for supporting the presser-roll journals and subject to spring-pressure, against which they will be raised proportionally to the extent to which the presser-roll is lifted by the thickness of the lumber.

As a means for limiting the drop of the chip-breaker, the boxes for the presser-roll are each provided with a projection or stop, *g'*, upon which said stops lugs *a* on the chip-breaker will rest when the machine is free from lumber, and the chip-breaker allowed to drop to its lowest position, as in Fig. 2, wherein it will be seen that the lowest point or toe of the chip-breaker is somewhat below the lowest level of the presser-roll. When a piece of lumber is run into the machine, it will first engage and lift the presser-roll. This rise on the part of the presser-roll (and consequently a like rise on the part of the presser-roll boxes that carry the stops *g'*) will necessarily lift the chip-breaker by reason of the engagement of the stops on the presser-roll boxes with the lugs *a* on the chip-breaker. During such action the presser-roll boxes move directly upward, while the chip-breaker in rising follows a curved path, and hence causes its toe portion to have an initial movement toward the presser-roll. To accommodate the stops to such movements on the part of the chip-breaker, the portions of the stops which engage the lugs *a* are made inclined, as in Figs. 2 and 4, whereby during the primary rising movement of the chip-breaker from its lowest position the lugs upon the chip-breaker will slide up along the inclines of the vertically-moving stops. The toe of the chip-breaker, however, during said action continues to project below the lowest level of the presser-roll to such extent that the advancing lumber may engage and lift the chip-breaker free from the inclined stops *g'*, whereby the full weight of the chip-breaker shall rest upon the lumber. It will be observed that the rise of the presser-roll serves to lift the chip-breaker sufficiently to permit the lumber, upon engaging the latter, to readily wedge under and lift it from its engagement with the stops.

The housings or guideways H for the presser-roll boxes are formed with or secured to the boxes for the rotary cutter-cylinder, so that by adjusting in height the boxes for the cutter-cylinder the housings for the presser-roll boxes may be correspondingly raised or lowered, and hence the lowest possible position of the presser-roll determined.

As a simple arrangement for providing a spring resistance against which the presser-roll is to be raised by the lumber, a cross-bar, *h*, which is arranged above the presser-roll and secured at its ends to the housings H, serves as a support for springs *h'*, which are at their inner ends bolted to the middle portion of the bar *h* and at their outer ends arranged to engage the presser-roll boxes, the arrangement of two of such springs being indicated in dotted lines, Fig. 1.

The means herein shown for adjusting in height the boxes F of the rotary cutter-cylinder consists of adjusting-screws I, arranged to engage in suitable bearings upon said boxes and driven from appropriate gearing, as at L, which gearing can be operated in any desired way. The boxes F for the rotary cutter-cylinder are herein guided along inclines on the standards K, (or "horns," as they are more commonly called,) it being observed that these horns are herein shown provided with appropriate guide-slots or guideways *k*, for the purpose of permitting sliding connections to be made between the boxes and the horn, as will be readily understood by those skilled in the art without further explanation.

What I claim as my invention is—

1. In a planing or surfacing machine, the combination, substantially as hereinbefore set forth, with the horizontally-arranged cutter-cylinder, of the chip-breaker arranged to rise and fall in the arc of a circle substantially concentric with the cutting-circle, and the swinging arms hung at the rear of the cutter-cylinder and pivotally attached to the chip-breaker, said arms being arranged to extend forwardly over the axis of the cutter-cylinder in opposition to the thrust of the incoming lumber against the chip-breaker when the latter is in its normal working position in front of the cutter-cylinder, and being further arranged to permit the chip-breaker to be swung over and to the rear of the cutter-cylinder, for the purpose described.

2. The combination, with the cutter-cylinder, of the chip-breaker arranged to rise and fall in the arc of a circle substantially concentric with the cutting-circle, the swinging arms C and D, pivotally connected with and arranged to control the chip-breaker in its said movement, and suitable adjusting devices, such as set forth, adapted to place the toe of the chip-breaker at a greater or less distance from the cutter-cylinder, for the purpose described.

3. The combination, with the cutter-cylinder, of the chip-breaker arranged to rise and fall in the arc of a circle substantially concentric with the cutting-circle, the swinging arms C and D, pivotally connected with and arranged

to control the chip-breaker in its said movement, and the adjustable eccentrics E, applied to adjust the connections between the arms C and the upper portion of the chip-breaker, substantially as and for the purpose described.

4. The combination, with the cutter-cylinder, of the chip-breaker arranged to rise and fall in the arc of a circle substantially concentric with the cutting-circle, and the presser-roll mounted in vertically-movable bearings which support and lift the chip-breaker to a height proportional to the height the presser-roll is raised by the incoming lumber, but which permit the incoming lumber upon reaching the chip-breaker to raise the same free from the support of the presser-roll bearings and in the arc of a circle substantially concentric with the cutting-circle, substantially as set forth.

5. The combination, with the chip-breaker arranged to rise and fall in a path substantially concentric with the cutting-circle of the rotary cutter-cylinder, of the presser-roll mounted in vertically-movable bearings provided with stops which engage and lift the chip-breaker to an extent proportional to the extent to which the presser-roll is raised by the incoming lumber, but which permit the lumber upon reaching the chip-breaker to engage and lift the same free from contact with the stops, substantially as described.

6. The combination, with the chip-breaker attached to swinging arms, for the purpose set forth, and provided with lugs *a*, of the presser-roll mounted in vertically-movable bearings provided with stops *g'*, having inclined surfaces which engage the lugs upon the chip-breaker, substantially in the manner described.

7. The combination, with the cutter-cylinder and a vertically-adjustable support therefor, of the presser-roll journaled in bearings arranged to slide in vertical guides in the support for the cutter-cylinder, the chip-breaker arranged to rise and fall in the arc of a circle substantially concentric with the cutting-circle, and the swinging arms C and D, hung upon the support for the cutter-cylinder and pivotally attached to the chip-breaker, substantially as and for the purpose described.

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