3 Sheets—Sheet 1.

E. G. ALLEN.

PLANING-MACHINE.

No. 176,918 Patented May 2, 1876.

Fig: 1.

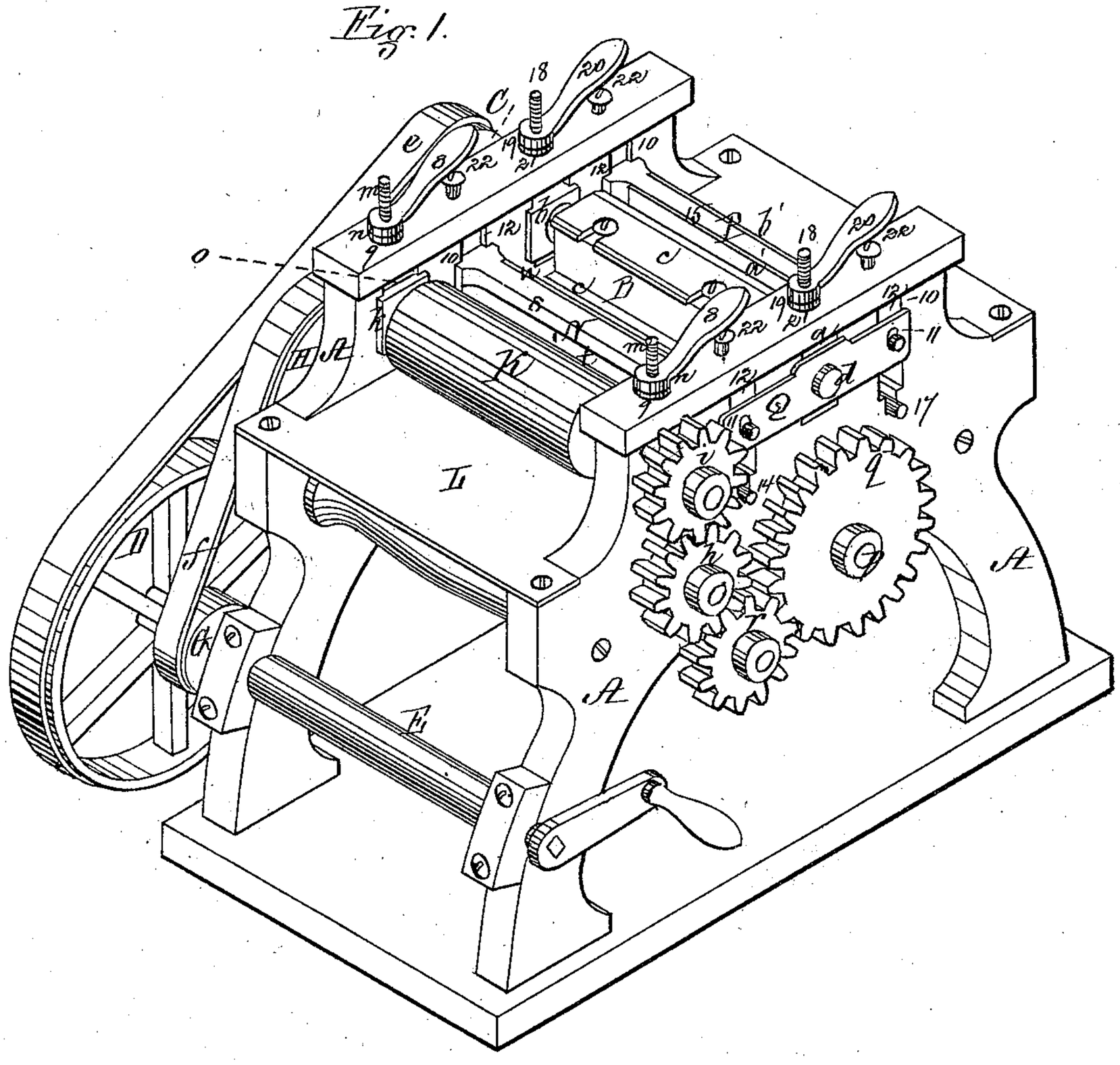

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Fig. 2.

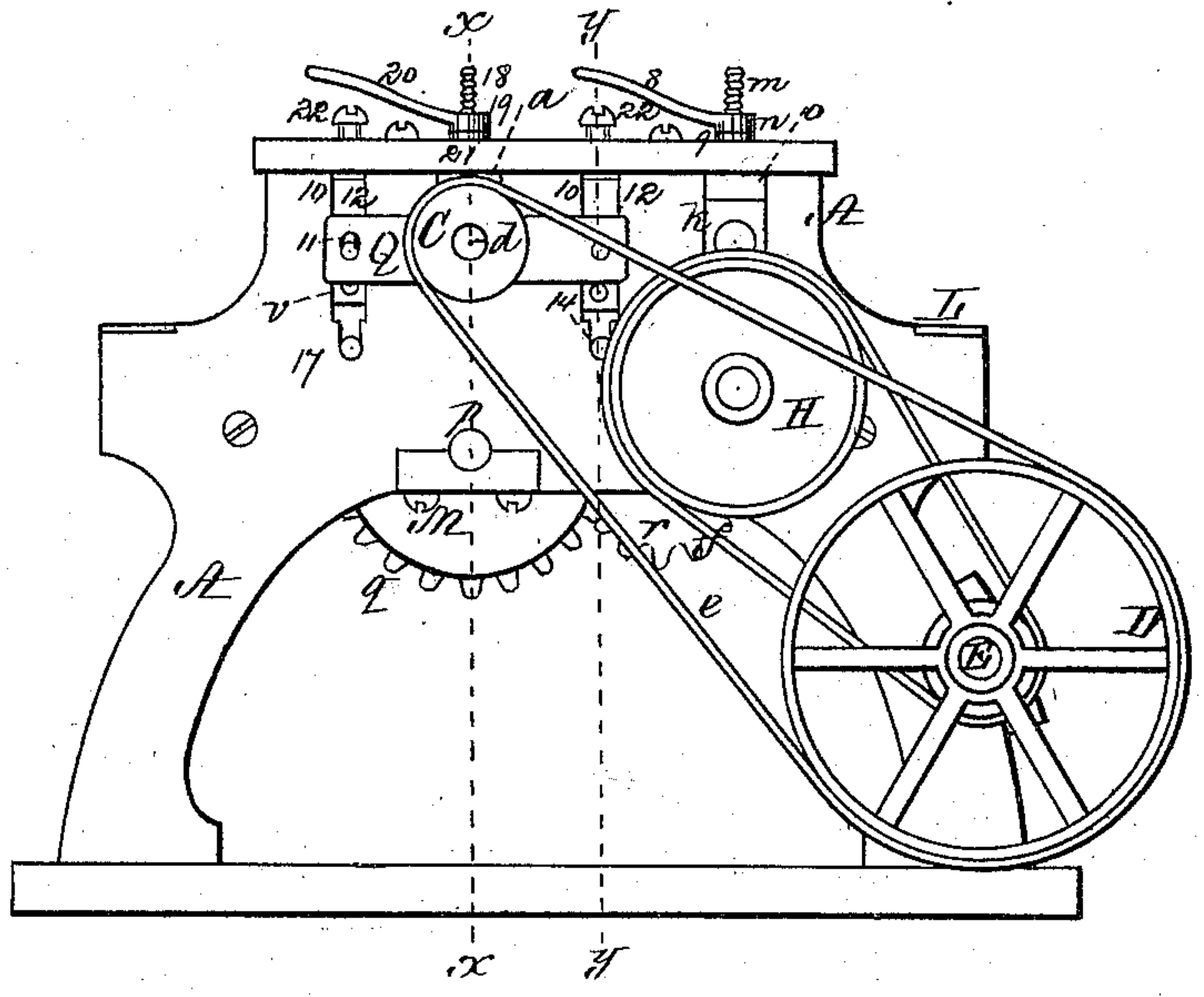
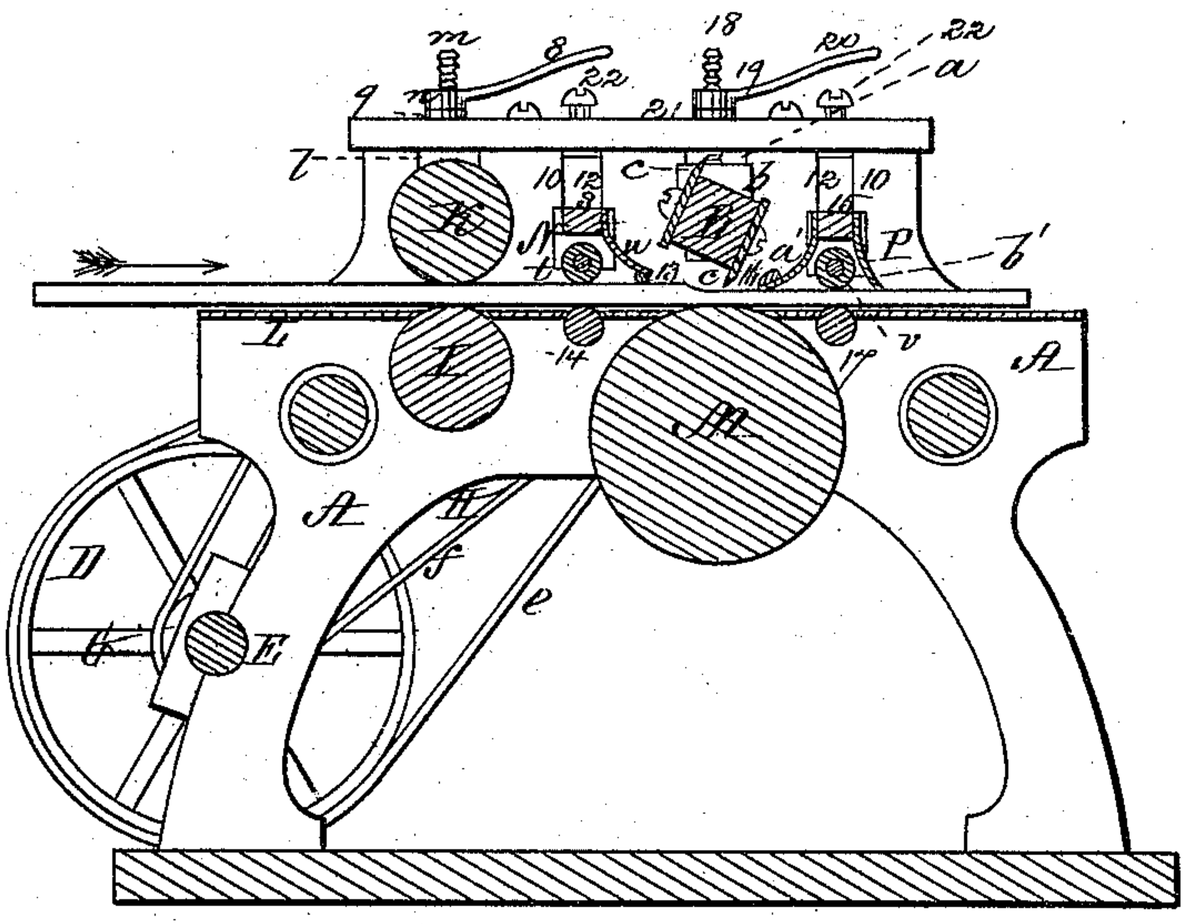


Fig. 3.



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3 Sheets—Sheet 3.

E. G. ALLEN.

PLANING-MACHINE.

No. 176,918. Patented May 2, 1876.

Fig: 4.

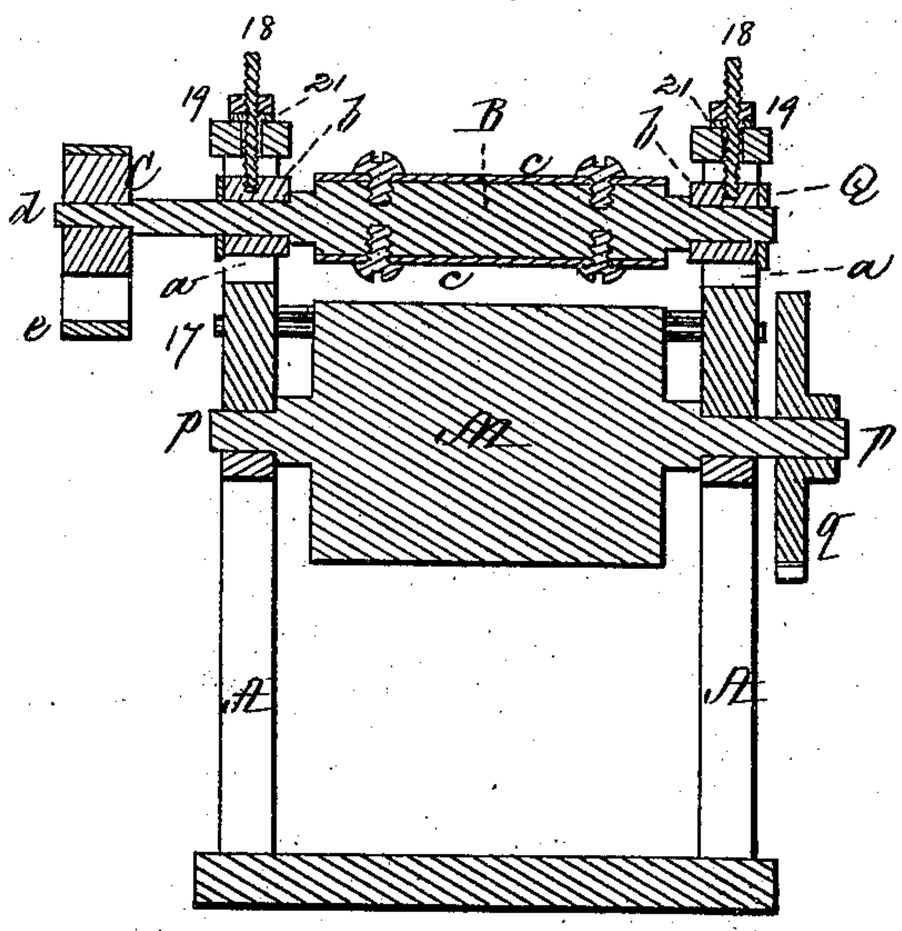


Fig: 5

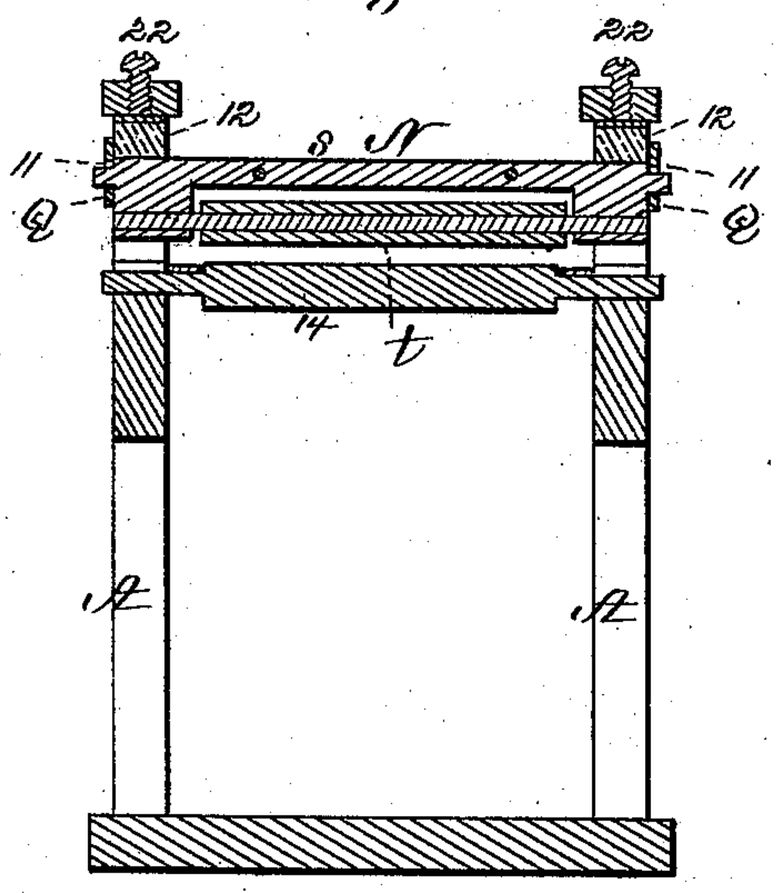


Fig: 6.

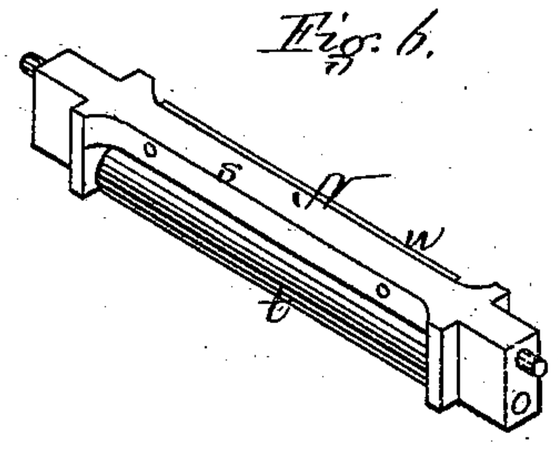
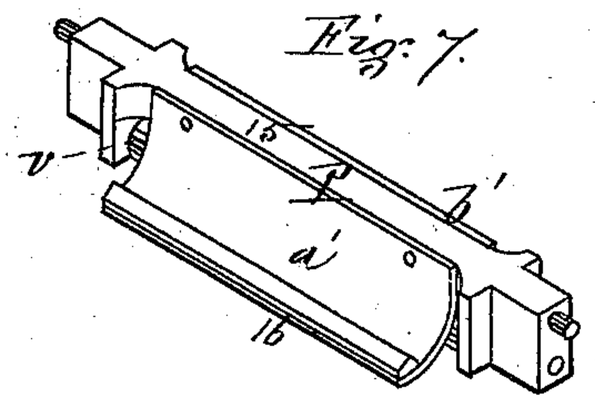


Fig: 7.



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UNITED STATES PATENT OFFICE.

ENOS G. ALLEN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO EDWARD F. KENDALL, TRUSTEE, OF SAME PLACE.

IMPROVEMENT IN PLANING-MACHINES.

Specification forming part of Letters Patent No. **176,918**, dated May 2, 1876; application filed January 3, 1876.

To all whom it may concern:

Be it known that I, ENOS G. ALLEN, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Planing-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of a machine for planing wood, with my improvements applied thereto. Fig. 2 is an elevation of one side of the same. Fig. 3 is a longitudinal vertical section through the center of the same. Fig. 4 is a transverse vertical section on the line *x x* of Fig. 2. Fig. 5 is a transverse vertical section on the line *y y* of Fig. 2. Figs. 6 and 7 are perspective views of pressure devices constructed in accordance with my invention.

In planing-machines as heretofore constructed, where the material to be planed is placed upon a solid bed or upon a traveling bed or apron resting on a solid and unyielding bed-plate, a great amount of friction is produced between the material and the solid bed, or between the bed-plate and traveling bed during the passage of the material, and consequently a considerable expenditure of power is required to drive the machine. To reduce the friction to a minimum, and thereby economize power, is the object of the first part of my present invention, which consists in a cylindrical rotating bed, the axis of which lies in a vertical line under the center of the cutter-shaft, the material bearing on its bed along a single line only, the greater part of the friction being centered at the journals of the cylindrical bed, and in addition to the reduction of friction resulting from the employment of a cylindrical rotating bed, the latter, being connected with the driving-shaft, assists in feeding the material through the machine.

The second part of my invention consists in combining in a pressure device a bar, a friction-roll, and one or more continuous longitudinal springs, the edge or edges of which bear and exert a strong pressure upon the material being planed, and will yield to the inequalities in the surface of the material independently of the vertical yield of the roll and the bar to which it is attached, by which construction the material is held steadily and firmly down on an even bearing as it passes through the machine, the edge of the spring nearest to and in front of the cutters, as well as that of the spring immediately in the rear of the same, being in close proximity to the line along which they are operating, the spring in front of the cutters serving as a chip-breaker.

My invention also consists in re-enforcing the lower or bearing edge of the spring of the pressure device, which bears on the material, with a strip of metal which protects the edge, and may be replaced by a new one when worn out.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A represents the frame-work of the machine, in vertical slots *a* of which are placed the boxes *b* of the journals of the cutter-head B, to which are secured the cutters *c c* by slots and screws in a well-known manner. The shaft *d* of the cutter-head B is provided with a small pulley, C, and is driven by a belt, *e*, passing over it, and a large pulley, D, on the end of the driving-shaft E. G is a small pulley, also secured to the driving-shaft, and communicating motion, by means of a belt, *f*, to a pulley, H, on one end of the shaft of the lower feed-roll I, the opposite end of which carries a gear, *h*, which engages with a similar gear, *i*, on the end of the shaft of the upper feed-roll K, the top of the lower feed-roll I being situated slightly above the level of the plate L. The journals of these feed-rolls are supported in boxes *k* placed in vertical slots *l* in the frame-work, the journals of the lower roll revolving in fixed bearings. Each of the boxes of the upper roll is provided with a screw, *m*, which extends up through the top of the frame-work, and over this screw turns a nut, *n*, having a handle, 8, a washer, 9, being interposed between the nut and the frame, by which means the distance between the feed-rolls can be adjusted for the passage of material of various thicknesses, a spring, *o*, being employed between the frame-work and each of the boxes *k* of the upper feed-roll, in order

that the latter may yield to inequalities in the surface of the material. M is a cylinder, having the bearings of its shaft *p* in the frame-work, and this shaft is provided with a gear, *q*, which is revolved by the gear *h* on the lower feed-roll, through the intermediate gear *r*. The shaft of the cylinder M is situated in a vertical line under the axis of the cutter-head B, the roll serving as a bed, which supports the material along a single line only, immediately under the point where it is subjected to the action of the cutters. By the employment of a cylindrical rotating bed, as above described, the friction which occurs in machines having a solid bed, or a traveling bed moving on a bed-plate, is avoided, nearly all of the friction being at the journals of the rotating bed, and being thus reduced to a minimum, and consequently much less power is required to operate the machine than heretofore. Furthermore, the rotating bed acts as a feed-roll, and assists in drawing and forcing the material through the machine.

N is a pressure device placed in front of the revolving cutters, and P a pressure device placed in the rear of the same. The ends of both of these devices rest in vertical slots 10 in the frame-work, and, projecting outside thereof, enter slots 11 formed in plates Q, which extend between them, the extremities of the cutter-head shaft also resting in circular holes prepared for them in the plates Q, which thus serve to couple them together.

Within the slots 10 in the frame-work, and upon the ends of the pressure devices, are placed springs 12, which serve to keep them down firmly upon the material, to hold it steadily during its passage through the machine and allow the pressure devices to yield as required.

The pressure device N, which is placed in front of the cutters *c c*—that is, between it and the feed-rolls—consists of a bar, *s*, a roll, *t*, and a metal spring, *u*, the roll *t* having its bearings in the ends of the bar *s*, which extends transversely across the machine, and the spring *u* being secured at its top to the side of the bar next to the cutter-head.

This spring *u* is curved in cross section, and its lower edge is re-enforced on the under side by a rounded strip of metal, 13, (see Fig. 3,) which protects the edge from wear as the material passes under it. The lower or re-enforced edge of this spring *u* bears upon and serves to firmly hold the material being planed in close proximity to the line along which the cutters are operating, the spring *u* yielding independently of the bar to conform to the inequalities of the surface of the material. The lower edge of the spring *u* serves as a chip-breaker, to prevent the tearing of the fibers, and holds the material down against the lifting tendency of the cutters.

In a line vertically under the roll *t* of the pressure device N is placed a friction-roll, 14, which supports the material at this point, and between these rolls *t* 14 the material passes after leaving the feed-rolls, the pressure-roll *t* and the spring *u* forming two bearings upon the material, which is thus held more steadily and effectually than were the roll or spring alone used.

The pressure device P consists of a bar, 15, a roll, *v*, and two curved metal springs, *a' b'*, secured at their upper edges to opposite sides of the bar 15. The spring *a'* nearest the cutters has its lower edge slightly turned up, and is re-enforced on its upper side by a strip of metal, 16, which gives the edge of the spring the required rigidity, the strip being placed above instead of beneath the edge of the spring, for the reason that the latter is subjected to less wear from the material after it has been smoothed by the cutters than the spring *u*, which is re-enforced on the under side on account of the material passing under it having a rough surface. The edge of this spring *a'* extends under the cutter-head and bears on the material being planed in close proximity to the line along which the cutters are operating, being placed at such height that the material, as it comes under its front edge, will raise it slightly to produce the desired downward pressure to keep the material steady. The other spring, *b'*, is not re-enforced, and its lower edge also rests on the smooth surface of the material and exerts a yielding pressure thereon, the edges of the two springs yielding independently of the roll *v* situated between them, which bears on the material, but does not yield independently of the bar 15, to which it is attached.

In a line vertically beneath the roll *v* is placed a friction-roll, 17, which forms a support for the material at this point, and facilitates its exit.

It will be seen that the pressure device P, above described, presents the advantage of having three separate and distinct bearings on the material, whereby the latter is kept down upon its bed at all times, and its end prevented, after it has left the front pressure device N, from being tipped up, which would cause it to be chamfered off and spoiled by the cutters; and I am thus enabled to utilize this portion or end of the material, which has heretofore, in many cases, been imperfectly planed. From each box of the cutter-head projects a screw, 18, which extends up through the top of the frame-work, and over this screw turns a nut, 19, having a handle, 20, a washer, 21, being interposed between the nut and the frame-work, by which means the cutter-head can be raised or lowered to bring the cutters to the desired cutting-level, the pressure devices N P being simultaneously moved with the cutter-head by the coupling-plates Q, and thus kept in their proper relative position with respect to the cutters. The slots 11 are elongated vertically, so as to allow the pressure devices to be raised by the material passing under them independently of and without raising the cutters; but the bottoms of the slots arrest the downward movement of the

pressure devices N P, and prevent them from descending below their proper relative position with respect to the cutters and to each other. Above each of the springs 12 is a screw, 22, and by means of these screws the force of the springs 12 and the consequent degree of pressure of the devices N P upon the material is regulated as desired. By the employment of the pressure devices N P constructed, as above described, the tremulous motion of the material under the rapid and powerful blows of the cutters is avoided, for the reason that the rolls and springs bear on the material at various points, and the material is held down close to the cutting-line, thus preventing the dislodgment of knots and shakes, while the springs of the pressure device P shield the roll *v*, and prevent chips and other small fragments from being caught under it and pressed down into the planed surface of the wood.

In order to avoid confusion in the drawings, the lower edges of the springs *u a'* are not placed as close to the line along which the cutters operate as would be the case in actual practice.

I do not broadly claim a spring bearing directly on the surface of the material being planed, as I am aware that a spring of this description is shown and described in the English Patent No. 7,926 granted to William H. Burnett in 1839; but this pressure device bears on the material on a single line only, and does not hold it as steadily as desired; neither do I claim a yielding-pressure bar, as I am aware that such a bar is described in the United States Patent of Joseph P. Woodbury, No. 138,462, dated April 29, 1873; but while this bar affords an extended bearing-surface and exerts a pressure on the material in close proximity to the line along which the cutters operate, there is no roll to relieve friction. My pressure device, however, has the combined advantages of a friction-roll, and two or more separate bearings on the material, which hold it down as firmly and with much less friction than a bar having an extended bearing-surface, a pressure being also exerted by my device in close proximity to the line along which the cutters operate.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a planing-machine a rotary planing-cylinder, in combination with the bearing-roll M, connected, by gearing, with the driving-shaft, to give it a positive motion, substantially as and for the purpose set forth.

2. In a yielding pressure device the combination of a bar, 15, two springs, *a' b'*, and a roll, *v*, placed between them, operating substantially as and for the purpose described.

3. In a yielding pressure device the combination of a spring, 12, bar *s*, a roll, *t*, and spring *u*, operating substantially in the manner and for the purpose set forth.

Witness my hand this 28th day of December, A. D. 1875.

ENOS G. ALLEN.

In presence of—
P. E. TESCHEMACHER,
N. W. STEARNS.