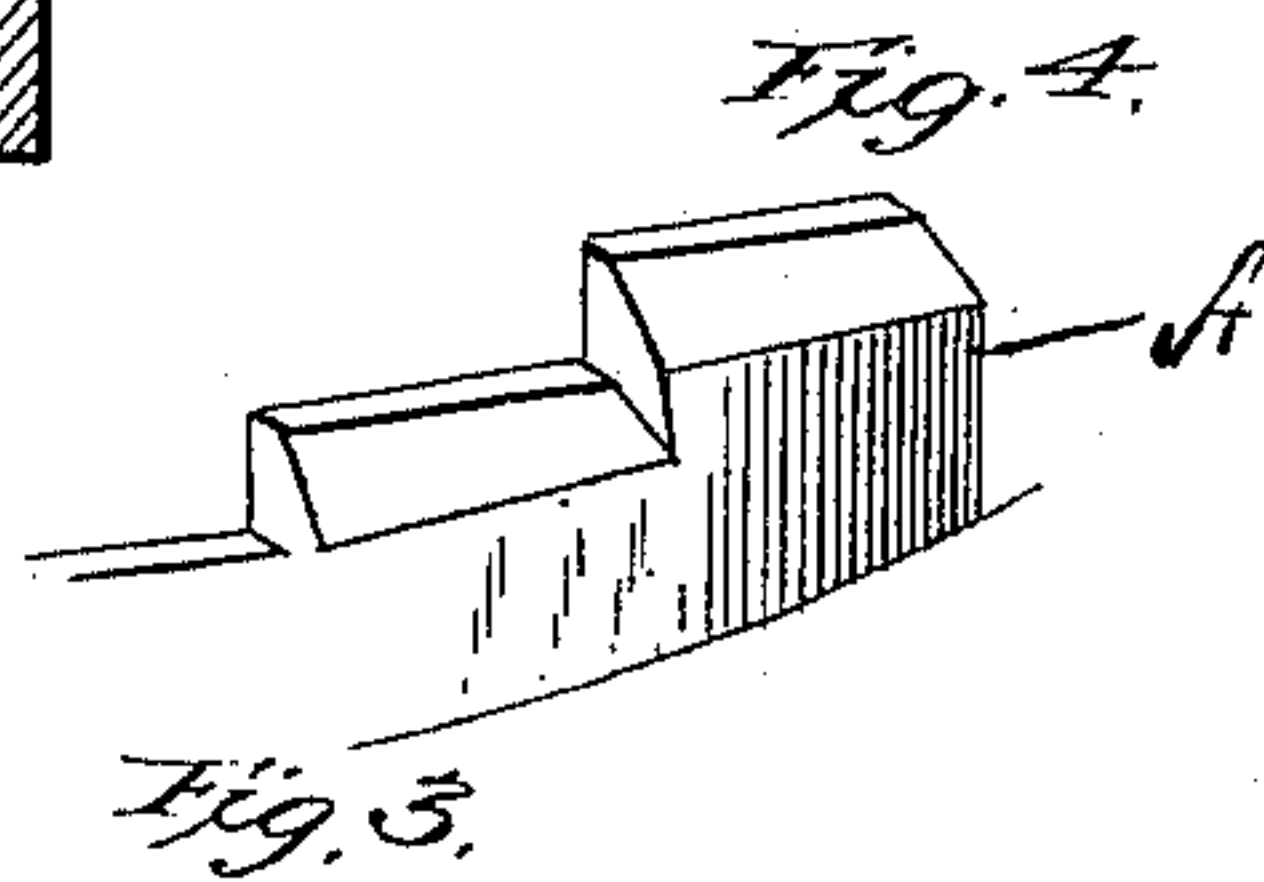
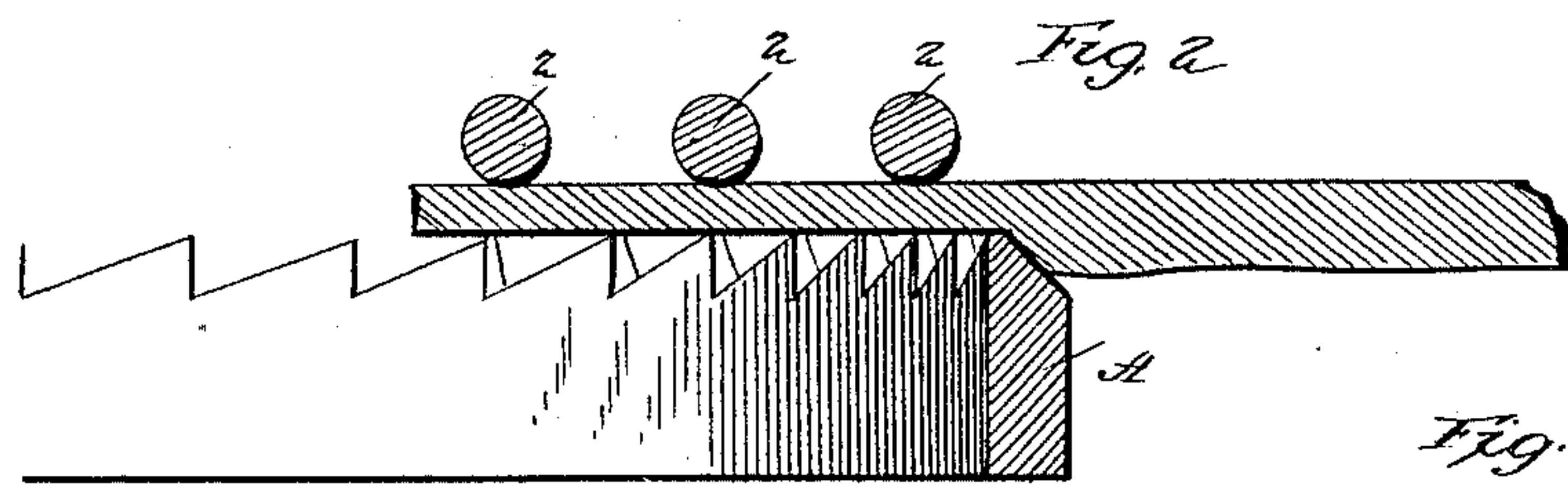
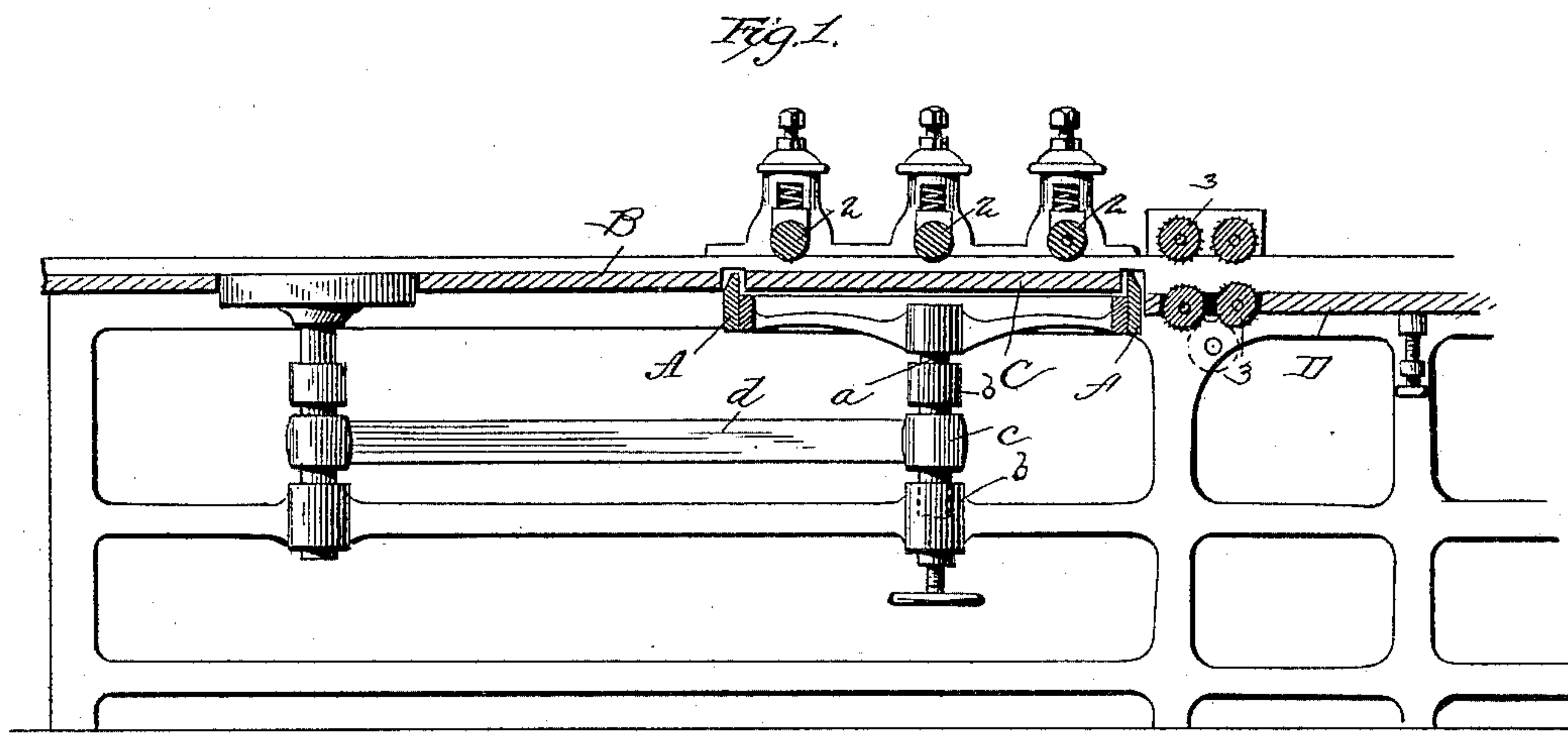


(No Model.)

J. H. RUDOLPH.
REVOLVING SURFACE PLANER.

No. 397,568.

Patented Feb. 12, 1889.



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UNITED STATES PATENT OFFICE.

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REVOLVING SURFACE-PLANER.

SPECIFICATION forming part of Letters Patent No. 397,568, dated February 12, 1889.

Application filed March 22, 1888. Serial No. 268,122. (No model.)

To all whom it may concern:

Be it known that I, JUSTUS H. RUDOLPH, of Elmira, in the county of Chemung and State of New York, have invented a new and useful
5 Improvement in Revolving Surface-Planers; and I do hereby declare that the following is a full, clear, and exact description of the same.

It is the object of my invention to provide means for leveling or making smooth rough
10 and uneven surfaces which are too rough and uneven to be made smooth by sand-paper and the like.

I have designed my invention for use particularly in connection with the frames of
15 school-slates; but it will be obvious that it has a much broader scope and may be substituted for the ordinary planer-knife to level or make smooth other wooden surfaces, or to reduce the thickness thereof.

20 My invention is a circular-band surface-planer rotating in a horizontal plane, whereby in its rotation every cutting-tooth engages with the surface to be removed, thus making the wear of the teeth uniform. In this re-
25 spect the invention differs from the ordinary cutter-head carrying planer-knives, which when mounted upon a revolving shaft beneath the table presents a length of cutting-surface which receives different proportions
30 of wear when the material operated upon is less than the entire width of the cutter, and in the case of strips and the like, usually fed along one side of the table as a gage, this soon causes the knives to become irregular
35 along their cutting-edges, and this great objection is obviated in my invention, as there can be no unequal wear of the teeth.

My invention consists, broadly, of a horizontally-revolving surface-planer arranged in
40 band form, with cutting-teeth having angular outer cutting-edges, whereby the material as it is fed thereto is cut by the angular cutting-edge before it passes within the circle of the planer.

45 The invention further consists of a circular planer composed of suitable metal arranged upon a suitable head in band form, with teeth arranged upon its edge, said teeth having cutting-edges extending at an angle inwardly
50 from the outer periphery of the saw, connect-

ing with horizontal cutting-edges extending across to the inner periphery of the planer.

The invention further consists, in the described tool mounted in suitable bearings, with pressure-rollers above the same for keep-
55 ing the work to the planer, of an adjustable table and feed-rollers for feeding the work from said adjustable table to the planer, and with a finishing-disk, with pressure-rollers
60 above the same, for smoothing or sandpapering the work as it leaves the planer.

In the drawings, Figure 1 represents in section the planer, the feed-table, and the finishing-disk, with pressure and feed rollers arranged in position. Figs. 2 and 4 represent
65 detail views of the planer, and Fig. 3 is a perspective view of the table.

In the manufacture of slates, after the slate has been framed it is necessary to plane or
70 shave off a portion of the upper surface, so as to remove all inequalities on the surface and to allow them to be finished for the market by the application of sand-paper or the like after the surface has been made regular by plan-
75 ing. I have found by experience that it is necessary to provide a planer which will remove a minimum amount of the surface of the frame without undue pressure against it in the cutting operation, for the reason that
80 portions of the frame, particularly the inner portions, which overlap the groove cut out for the edge of the slate, and the mortise and tenons of the corners are weak by reason of said groove, and any amount of pressure
85 exerted upon the frame at these points will have the tendency to split the lips of the frame. My aim, therefore, is to cut the sur-
90 face of the frame by an advancing or sweeping cut, which will strike the grain of the wood at an angle, whichever way the grain may run, and to cut the same, without regard to the
95 character of the wood, smoothly and without tearing the fiber, and the pressure exerted by the cutting-face of the planer-teeth is directly against that portion of the material
100 which is to be removed, and therefore longitudinally of the surface acted upon. This is a distinctive feature of my invention, and differs from the ordinary method of removing or planing down the surface of frames or like

articles by means of planer-knives, as before referred to, where the cut is directly against the material, the latter method of operation leaving an irregularly-shaped surface, which
 5 requires additional planing to make it level and smooth, and unless the material is of superior quality planer-knives cannot be used without tearing up the knotty portions of the wood, while with my planer I can reduce the
 10 most inferior grades without tearing the surface, and the operation can be carried on at a much greater rate of speed.

In the drawings I have represented my circular planer at A. It consists of a band of
 15 metal set on edge and secured to a suitable head which is rigidly connected to a shaft, *a*, having bearings in suitable boxes, *b*, with a driving-pulley between the boxes, (indicated at *c*,) in connection with a suitable source of
 20 power through a driving-belt, *d*.

The shaft *a* of the planer is adjustable vertically in its bearings to compensate for the wear. While I have shown the planer arranged in an inverted position, adapted to
 25 have the work pass above it, it will be understood that it is equally effective if arranged in an opposite position, and adapted to have the work pass beneath it.

The planer is supported from the hub by
 30 means of radial arms, the openings between them allowing for the discharge of the saw-dust, which may be received into a hopper and carried off by an exhaust.

The upper edge of the planer is serrated to
 35 form teeth, and the outer face of each tooth is inclined inwardly on its cutting-edge, so as to form an angular cutting-face. This incline I prefer to make at an angle of about forty-five degrees, though it may be more or
 40 less, and the material of the planer is made of any suitable thickness, so as to leave the tooth of any desired width from the inner point of the angle to the interior surface of the blade, this portion of the tooth being hori-
 45 zontal. If desired, the horizontal cutting-edge may be omitted, and when the saw-blade is sufficiently thin the teeth may be set out at an angle to the body of the blade, which, it is obvious, would effect the same result—
 50 namely, present an angular cutting-edge to the work. The horizontal cutting-face on the top of the tooth is very desirable, for the reason that it removes all loose fibers left by the angular face, and has a smoothing-effect upon
 55 the surface.

The table for the work is arranged in the following relation to the planer when it is used in an inverted position, as shown: A chan-
 60 nel of sufficient width to accommodate any width of work is made in the table, with ledges upon either side, raised above the channel, the said ledges being of a sufficient height to allow them to clear the teeth of the planer. The width of the channel (shown at B) is less
 65 than the diameter of the planer, and is provided with curved slots (shown at E) to allow for the blade of the planer to project through

and to be adjusted therein. It will thus be seen that while the planer may be adjusted to penetrate to the level of the fixed part of
 70 the table through the curved slots in the channel the circle of the planer will not be completed within the channel, but portions of it will always be outside and beneath the ledges, which thus allows me to have the portion of the
 75 table within the circle of the planer (shown at C) supported from the side walls of the ledges bordering on the groove. Within the channel, or above the same, within a space equal to the distance between the curved
 80 slots, I arrange a series of pressure-rollers, 2, which have suitable spring-bearings, so that they may be self-adjusting to the different thicknesses of material and keep the same pressed down against the cutting-edges of the
 85 planer. These rollers may be simply idlers, or they may be connected to a source of power.

The portion of the channel D in front of the line of movement of the planer I make adjustable, so as to allow by the adjustment of
 90 the table for the amount of material which I desire to remove from the surface of the frame or other article. Above and beneath this table I place feed-rolls 3, the under rolls passing through slots in the table and suitably
 95 geared to each other, so as to turn in opposite directions to feed forward the material placed between them.

The movable table is adjusted so as to bring the slate-frame below the upper line
 100 of the teeth of the planer in just the proportion which it is desired to remove the surface of the frame or other article. After the material has passed above the planer, it passes onto the stationary table in rear of the same,
 105 and in case the frame or other article requires a smoother surface than that given to it by the cutting action of the planer I provide a disk rotated from a suitable source of power and operating in an opening in the bed of the
 110 table, and covered by sand-paper, emery, or like material. In suitable spring-bearings above this disk I also provide bearing-rollers, which tend to keep the work down to the disk, and, like the rollers above the planer, are self-
 115 adjusting to the different thicknesses of material. These rollers may be idlers or power-rollers, to give the material positive movement across the face of the disk.

While I have described my invention in
 120 connection with the planing of wood, I do not desire to be limited to this application, as the invention may be applied to the planing of the surfaces of other material.

I claim—

1. A planer consisting of a circular band having a toothed edge, each of said teeth being provided with two cutting-edges, said edges being formed in different planes, substantially
 125 as described.

2. A planer for leveling or making smooth rough and uneven surfaces, consisting of a circular band having a serrated edge forming
 130 teeth, said teeth having a cutting-edge in one

plane, as horizontal, and an angular cutting-edge extending from the horizontal edge outwardly to the outer surface of the blade, substantially as and for the purpose set forth.

5 3. The described planer, consisting of a curved band having teeth on its edge, said teeth being provided with cutting-edges formed in different planes, in combination with a suitable table to support the work, 10 substantially as described.

15 4. In combination, a planer having teeth on its edge provided with cutting-edges formed in different planes, a shaft for supporting the planer, means for rotating it, and a table having one part thereof adjustable, substantially as described.

20 5. In combination, a planer consisting of a circular band having teeth on its edge provided with cutting-edges formed in different planes, a shaft for supporting the planer in horizontal position, a table arranged above the saw having a depression or groove within the diameter of the planer and raised ledges on either side thereof, curved slots for the teeth 25 of the blade to work in, an adjustable table to direct the work to the angular cutting-

teeth, and suitable pressure and power rollers, substantially as described.

6. In combination, a planer having teeth on its edge provided with cutting-edges formed 30 in different planes, a shaft for supporting the same, a table for the work, suitable power and pressure rollers, and a disk covered with sandpaper or the like, arranged in line with the same and adapted to finish the work as it 35 passes from the said planer, substantially as described.

7. In combination, a planer consisting of a blade having teeth, said teeth having one cutting-edge extending from one side of the blade 40 partially across the edge of the same, and a second cutting-edge extending at an angle to the first and the other side of the blade, substantially as described.

In testimony whereof I have signed my name 45 to this specification in the presence of two subscribing witnesses.

JUSTUS H. RUDOLPH.

Witnesses:

ROBERT E. MORRIS,
F. L. MIDDLETON.