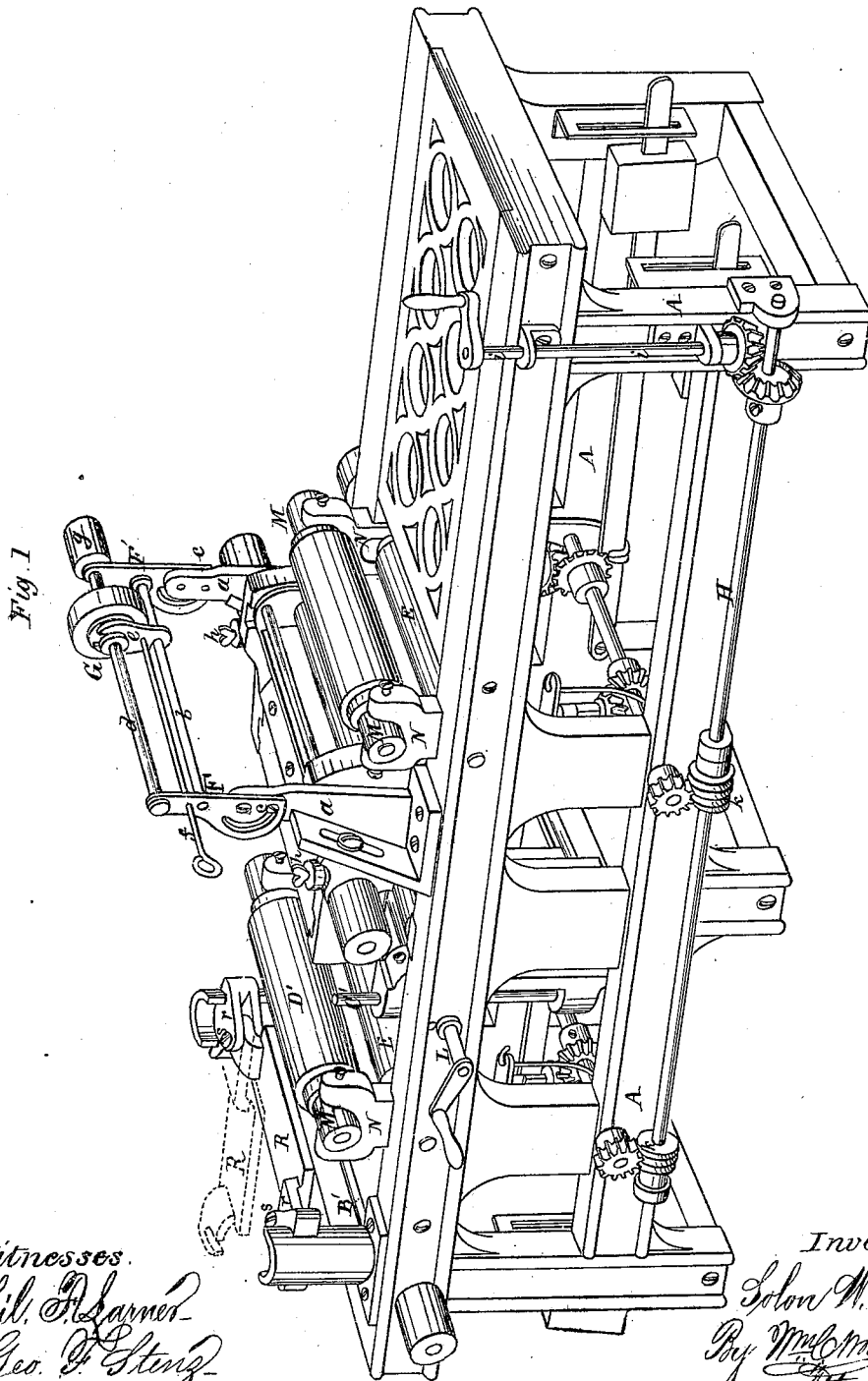


S. W. NELSON.
Planing-Machines.

No. 142,936.

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Fig. 3.

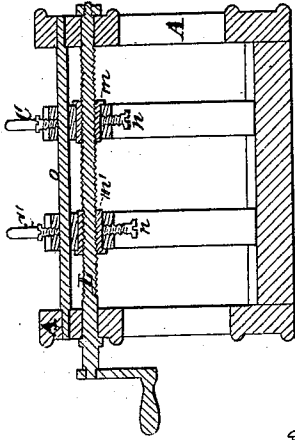


Fig. 2.

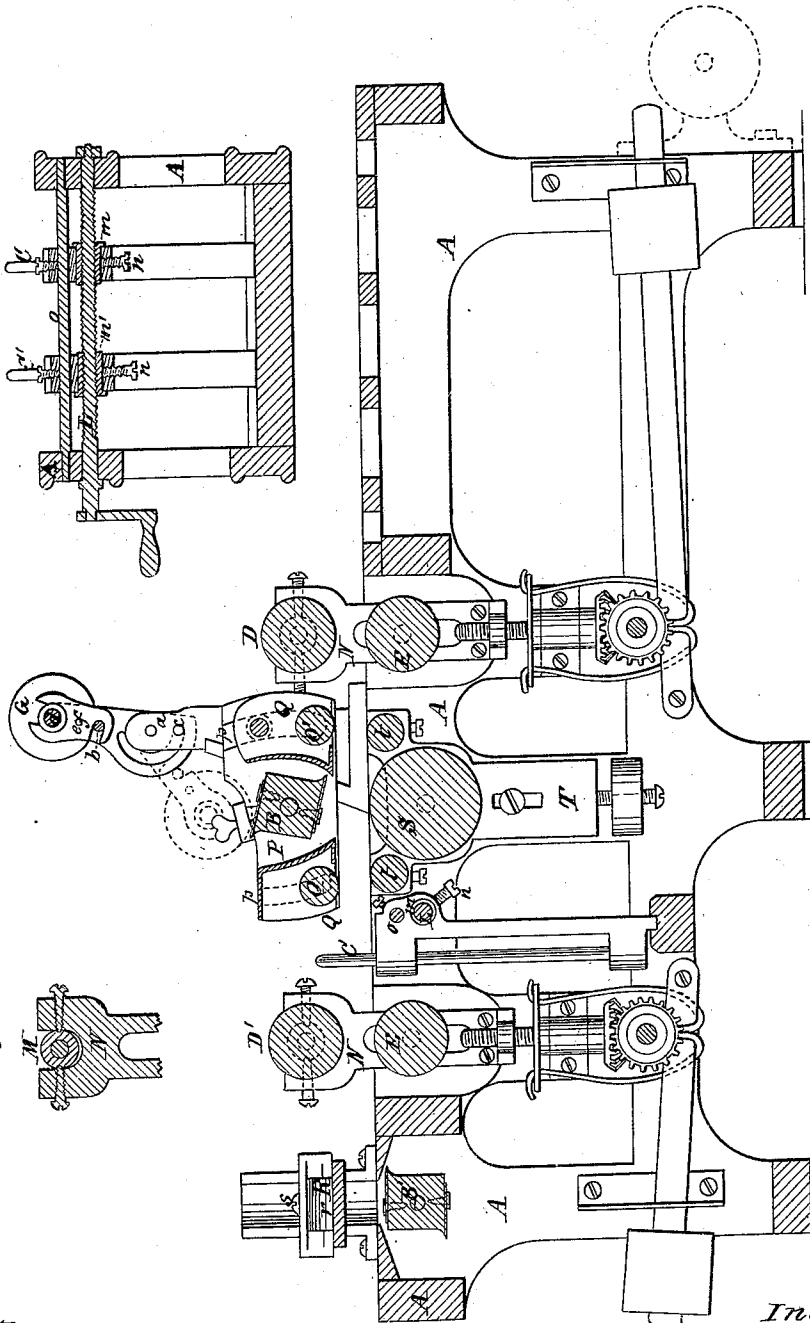
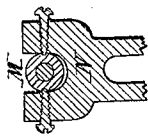


Fig. 4.



Witnesses.
Phil. H. Warner
Geo. F. Stutz

Inventor.
Colon W. Nelson
By *W. C. Wood*
Attorney-

UNITED STATES PATENT OFFICE.

SOLON W. NELSON, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN PLANING-MACHINES.

Specification forming part of Letters Patent No. **142,936**, dated September 16, 1873; application filed February 27, 1873.

To all whom it may concern:

Be it known that I, SOLON W. NELSON, of the city and county of Worcester, in the State of Massachusetts, have invented certain new and useful Improvements in Planing-Machines.

My improvements relate particularly to that general class of machines which are commonly known as the "Woodworth Planers," and which are usually provided with one or more facing-cylinders and matching-heads. They are also, in part, applicable generally to cylinder planing or molding machines; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and accurate description of a machine embodying the several and combined features of my invention.

My invention consists, first, in a novel method of grinding the cutters, and involves the attachment of a grinding apparatus to the frame of the machine, adjacent to the cutter-head, by means of which the knives or cutters may be rapidly and efficiently sharpened while occupying their proper positions on the cutter-head, and while said cutter-head is in a proper working position in the machine, thus effecting a great saving in the time of the operator and of the machine, and wholly avoiding the heretofore existing necessity for careful and accurate adjustment of the knives on the cutter-head, and the cutter-head in its bearings, as has heretofore been necessary when the knives have been separately detached, or the cutter-head removed from the machine, for the purpose of grinding the knives or cutters; secondly, in a novel construction and arrangement of the mechanism for controlling the lateral movement of the "matcher-heads," by means of which both heads may be controlled by a single screw, thus simplifying the construction of this portion of the machine, and facilitating the adjustment of the heads; thirdly, in a novel construction of the pressure-plate over the under cutter-head, by means of which it may readily be swung to the one side and afford free access to the head; and also in certain other minor points, hereafter more fully described.

Referring to the drawings, of which two

sheets are presented, Figure 1, Sheet 1, represents, in perspective, one of my machines. Fig. 2, Sheet 2, represents the same in longitudinal vertical section. Fig. 3, Sheet 2, represents, in longitudinal section, the screw for adjusting the matcher-heads and the adjacent parts, involved in the third feature of my invention. Fig. 4, Sheet 2, represents, in transverse section, the journal and box of a feed-roller, and the yoke sustaining the same.

A denotes the frame of the machine, which is preferably composed of cast-iron. It has been specially designed, as shown by me, with a view to the proper distribution of bulk and strength, in order that economy in construction may be attained, as well as increased convenience and a lessened cost of transportation. B and B' denote the upper and lower cutter-heads, respectively. C and C' denote the matcher-head spindles. D and D' denote the upper feed-rollers of the front and rear sets, respectively. E, in each instance, denotes a lower feed-roller.

These several devices, so far as relates to their functions, possess no novelty.

The mechanism involved in the first feature of my invention is located adjacent to and above the upper cutter-head B, and consists of two swinging cams, F and F', which are pivoted to the inclined uprights *a*, on the sides of which the two cutter-head boxes are mounted. The axes of the pivots are truly coincident with each other, and parallel with the axis of the cutter-head. Extending from one swinging arm to the other is a tie-rod, *b*, which unites the two, and with them virtually constitutes a frame, capable of being swung to and from the cutter-head. In each swinging arm is a curved slot, describing an arc of a circle, of which the pivot is the center. A set-screw, *c*, in the inclined standard *a*, extends through the slot, and serves as a means for rigidly setting the arms at any desired radial position. G denotes a grinding-wheel, which may be composed of stone, or any of the so-called emery compounds. It is mounted on a longitudinally-grooved shaft, *d*, and provided with a projecting lug within its hub, to loosely fit the groove. The hub of the wheel has an angular groove cut in its periphery, to which the upper end of a

sliding yoke, *e*, is fitted. The lower end of said yoke embraces the rod *b*, which serves in this connection as a guide. The yoke and the grinding-wheel are made to move longitudinally on the shaft *d* by means of an operating-rod, *f*, attached to the yoke, and extending through an opening in the swinging arms *F*. The grinder and its shaft are rotated by means of a belt-pulley, *g*, on one end of the shaft, to which power may be communicated from any convenient point. The cutter-head boxes are provided with set-screws *h*, which, by engaging with the upper section of the box, compress, without injury thereto, the journals of the cutter-head, and thereby may firmly hold the head in any desired position. Instead of removing the cutters for grinding, as has been heretofore customary, the cutter-head is properly fixed in position with one of its knives upward, and with its bevel on a line practically parallel with the horizontal plane of the machine. The grinding-wheel is then brought down, properly adjusted to its grinding position, and permitted to revolve, during which it is moved to and fro along the whole length of the edge. Care will necessarily be taken not to grind too fast, nor to neglect the application of proper cooling lubricants, usually essential in like cases. After one knife is completed, the next is brought up and treated as before described.

It is well known that in adjusting cutters great care and skill are requisite, and that much loss is incurred by having the machine idle during this hitherto considered necessary operation after each grinding.

With my apparatus the knives may be set with edges as far from the periphery of the cutter-head as may be considered safe, and never again removed, or require any readjustment until actually worn up to the cutter-head, or so near thereto as to absolutely necessitate an adjustment for the prime purpose of advancing them therefrom.

So readily can the sharpening operation be effected that it will be found desirable, after every hour's work, to devote a few minutes to the knives, and thus secure satisfactory results with actually less injury to the cutters than if neglected until the grinding be absolutely unavoidable. By having the swinging frame capable of ready attachment at points fitted to receive it, adjacent to the under cutter-head, like results may be attained therewith.

It is of great practical value to so combine the apparatus with the machine that no displacement of its several operative parts will be requisite.

I am aware that various devices for grinding planer-cutters have been employed, and that some have been arranged to grind cutters while affixed to the cutter-head, which was necessarily detached from the machine for that purpose; but I know of none which have, prior to my own invention, been practically adapted to accomplish that end while the knives are

in proper position on the cutter-head, and while the latter is in proper working position in the machine.

The mechanism involved in the second feature of my invention consists mainly in the adjusting-screw *L*, as combined with the vertical spindles *C* and *C'*, on which the matcher-heads are mounted in the usual manner. In Fig. 3, Sheet 2, the improvement is fully illustrated. It is well understood that the lateral movement of these spindles is essential; that sometimes one or both of them require movement toward or from the center of the machine. As heretofore constructed they have each been controlled by a separate screw adapted thereto. As constructed by me both are operated by the one screw *L* by means of two bush-nuts, *m* and *m'*, which are fitted to the screw, and also to circular bearings in the carriages of the head-spindles. Each of these nuts *m* is provided with a means for rendering it fixed with relation to the spindle-carriage. In this instance a set-screw, *n*, is employed, which passes through the adjacent portion of the carriage and engages with the nut. It will be readily comprehended that when these nuts are securely held in their bearings by the set-screws they cannot revolve, and, therefore, on revolving the screw *L* the carriage will be moved to and fro. On the contrary, however, if the nut be free to revolve in its bearings in the carriage, it will also revolve freely with the screw; and therefore effect no movement of the carriage. A stay-rod or slide, *o*, is provided above the screw *L*, which passes through the spindle-carriages in such a manner that they can freely slide thereon. Set-screws are also provided for rigidly affixing the carriages to the slide-rod, when desired.

After having properly adjusted one spindle its nut *m* will be released, and the carriage secured to the slide-rod, although no movement longitudinally on the screw would be possible, except through its rotary movement; the other spindle may then be adjusted with relation to the fixed one from time to time, as may be desired. This construction and arrangement practically result in economy in manufacture and simplicity in operation.

The third feature of my invention is embodied in the pressure-plate *R* over the under cutter-head *B'*. As heretofore constructed, these plates were necessarily removed bodily from their standards whenever access from above to the cutter-head was desired. To obviate this necessity it has even been proposed, and to a certain extent practiced, to slide the cutter-head longitudinally, in a carriage prepared for the purpose, out through an opening in the side of the frame. The pressure-plate has also heretofore been so mounted upon one of its standards that it could be swung up vertically to one side, necessitating therefor, however, a laborious lift endwise of the plate. The inconvenience and delay of the bodily handling of the plate, and the great expense involved in the sliding cutter-

head, are obviated by my improvement, which consists in mounting the plate R in a heavy horizontal hinge-like bearing, *r*, at one end, by which it may be readily swung to one side and back again, requiring only to be secured when in position by means of the holding set-screw *s*. For securing a solid non-frictional bearing below the knives, I employ a heavy cylindrical rotary bed, S, with the upper cutter-head B, and so place them that the axes of the two will be parallel and on the same vertical line. The rotary bed is mounted on vertical slides T, which are vertically adjustable in order that any slight wear in the bearings which may occur may be readily compensated from time to time. On each side of the rotary bed are two small friction-rollers, *t*, which are also mounted on the slides T, but are capable of an independent vertical adjustment. By this means described a constant, never-varying, solid bearing for the timber or board being planed is attained at the very point at which it is most essential, and if properly backed up at that point good results are usually attained.

I am aware that it is not new to place rollers in a bed for the mere purpose of relieving friction; but I am not aware that a roller has ever before my invention been combined with a cutter-head in such a manner as to serve as a bed in itself, and to afford a special bearing beneath the point at which the knives are to do their work.

The combination and arrangement of mechanism employed by me for controlling the upper feed-rolls, as herein described, are believed to be of my own invention, but are made in part the subject-matter of a separate pending application for Letters Patent. A description of this portion of the machine is, however, incidentally herein described, as follows: The shaft H is provided with several worms, *k*, which engage with worm-gears *k'*, which are keyed to horizontal shafts beneath the machine, and which are in turn geared to vertical screws, by means of which the feed-

rollers are elevated. It will not require further description to explain how, by turning the crank-shaft *i*, the several roller-screws are simultaneously operated.

None of the belting or gearing are shown or described. The main drum is located in its usual position, as indicated in dotted lines in Fig. 2, and any of the well-known methods of communicating power therefrom may be adopted.

For driving the grinder, a round belt may be profitably employed, and if detachable belt hooks or clasps are used the belt may readily be applied or removed. The grinding apparatus, substantially as herein described, is to be made the subject of a separate application, and it, therefore, in itself, is not specifically claimed herein.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The grinding apparatus, substantially as herein described, in combination with a cutting-cylinder of a planing-machine, and in proper relation therewith, whereby the several knives or cutters may be successively ground while properly adjusted on the cutter-head and in proper position in the machine.

2. The combination, with the matcher-head spindles, of the adjusting-screw L, and the bush-nuts *m* with their set-screws, by means of which, one, or both, or neither of the spindles may be moved to or fro from the center line of the machine by the revolution of the screw, substantially as described.

3. The pressure plate R, hinged to a sliding block on one standard, and capable of attachment to another on an opposite standard, and constructed and arranged to swing laterally away from the under cutter-head, as described.

SOLON W. NELSON.

Witnesses:

J. HENRY HILL,
H. C. RICE.