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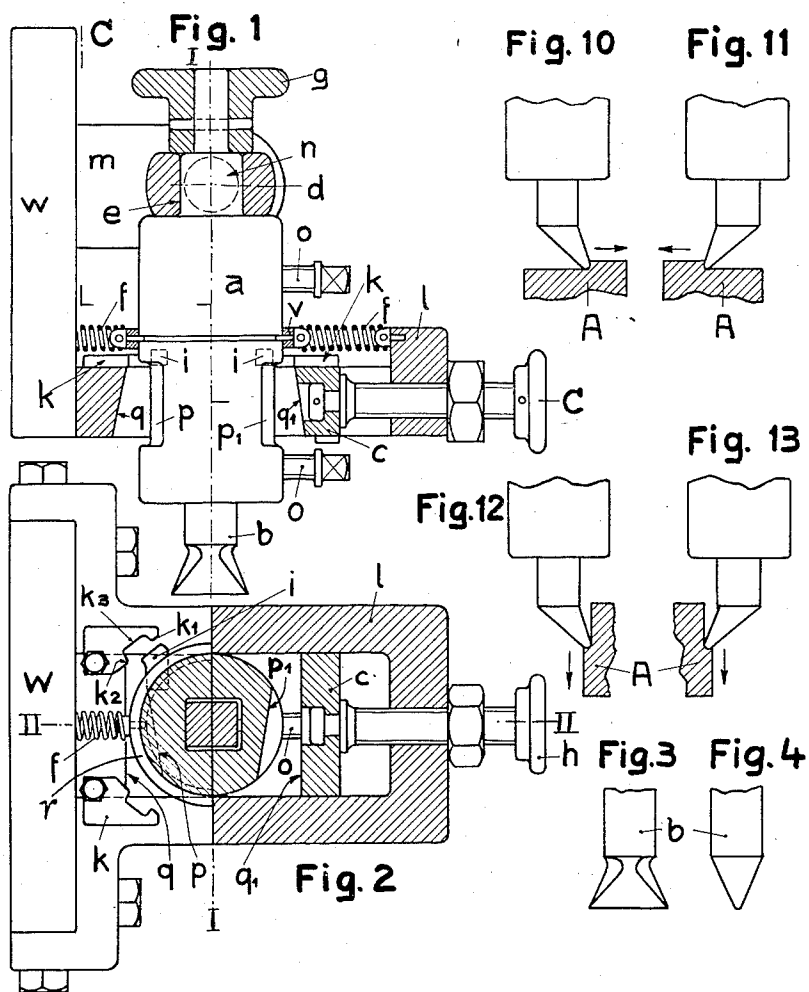
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TOOL HOLDER FOR TWO-WAY PLANING

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2 Sheets-Sheet 1



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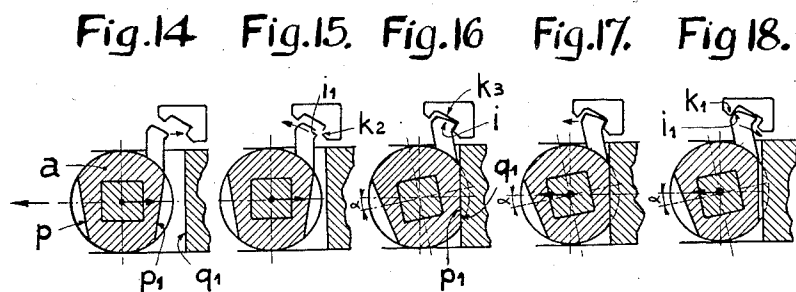
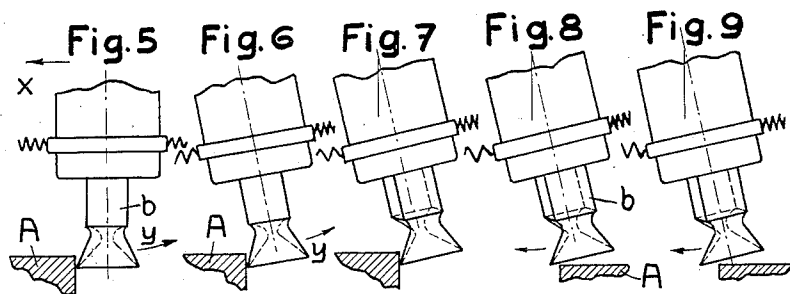
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UNITED STATES PATENT OFFICE

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TOOL HOLDER FOR TWO-WAY PLANING

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4 Claims. (Cl. 90—53)

This invention relates, generally, to improvements in tool- or cutter-heads of planers or shapers embodying a single double-faced cutting tool, and, more particularly, to a method of suspension of such heads, which, in combination with a plurality of auxiliary devices on both head and head-carrier, allows an automatic setting of the tool-head into its correct position for each operative run.

The objects of my invention are, first, to make use of but one cutting tool; second, to afford facilities for the automatic setting of the tool-head into its correct position for each operative return run; and, third, to suspend the tool-head in its carrier in such a way, which, in combination with a set of stop-faces on both head and carrier, allows great chip-areas with a positive and steady operative action of the tool itself.

I am aware that it has been proposed before to adapt tool-holders for two-way planing with a double-faced steel. The resetting of the tool at the end of an operative run into its correct position for the return operative run was then effected by way of supporting the holder on a horizontal axis, either at half its height or lower still; such an arrangement being, however, of disadvantage, as the pivot then is excessively loaded and the tool itself is subjected to excessive bending stresses, which factors combined result in relatively small chip-areas, as otherwise the tool would begin to oscillate while in action.

Again it has been proposed to allow the tool-head not only to swing about a horizontal but also about its longitudinal axis, so as to give the tool its correct operative setting by means of a special lever-system involving a special switch on the planer.

With the present invention the holder in its carrier is allowed a pendulous motion releasing the swing of the holder for setting the clearance angle, the latter being the angular displacement of the tool, or its holder, about its longitudinal axis and is measured in a plane at right angles to said axis. In this way a much more simple and dependable construction of the tool-holder and appurtenant devices is assured, independent of any special switch lever-system.

I attain aforementioned objects by the mechanism illustrated in the accompanying drawings, in which—

Fig. 1 is a side elevation of the tool-holder and appurtenant devices, partly in vertical section;

Fig. 2, a section along line C—C of Fig. 1;

Fig. 3, a side elevation of the cutting tool;

Fig. 4, a front elevation of same;

Figs. 5–9, side elevations of the cutting tool at various longitudinal and horizontal angular displacements, illustrating the pendulous motions of the tool-holder at the start, during, and at the end of its operative run;

Figs. 10–13, side elevations at four different tool-settings, which may be effected without resetting the tool in its holder, and where for the sake of clearness a single-faced tool is illustrated;

Figs. 14–18, horizontal sections of the tool-holder and referring respectively to Figs. 5–9 lying immediately above.

Similar letters refer to similar parts throughout the several views.

w is part of the head-carrier standard, with frame *l* and two bearings *m* in a fixed position. Collar *d*, to which tool-holder *a* is attached, is suspended from bearings *m* by means of a horizontal pivot *n* and also a vertical pivot *e*, and thus is freely revolvable both vertically and horizontally.

Tool-holder *a*, essentially of a cylindrical shape, carries a hand-wheel *g* for swinging the holder about its longitudinal axis for 180° for a purpose described subsequently. The double suspension *n—e* allows holder *a* to swing in a pendulous motion from the horizontal pivot *n* and a free displacement around its longitudinal axis on pivot *e*. Tool *b*, possessing a double-faced cutting edge according to Figs. 3 and 4, is secured in its holder *a* by usual set-screws *o*. Tool-holder *a* freely passes through an opening in frame *l* and is guided by two of the latter's inner faces. Two springs *f*, pushing up against a ring *v* carried around holder *a*, and bearing on frame *l* or respectively on part *w* of its support, are aiming to stop said pendulous motion of holder *a* and arrest the latter in the mean position according to Fig. 1. The lower part of holder *a* possesses two check-faces *p* and *p*₁, lying vertical in the normal position according to Figs. 1, 2 and 5 and in planes including equal horizontal angles with an axial plane I—I (Figs. 1 and 2). In the opening of frame *l* I have another pair of check-faces *q* and *q*₁, lying in planes including equal vertical angles with said axial plane I—I and with their upper and lower marginal edges parallel to the latter. Check-face *a*₁ forms one side of a stop *c* which is horizontally adjustable by means of a threaded spindle and a hand-wheel *h*.

On the upper side of frame *l*, on the four corners of the frame-opening and at the same height, I have four horizontally adjustable

stops k , each possessing two corners k_1 and k_2 and between these latter a recess k_3 . On one axial half of holder a , on one side of a vertical axial plane II—II, there are two stops i lying 5 symmetrically to either side of axial plane I—I and which may co-operate with adjacent stops k of the frame-opening. Turning holder a for 180° about its longitudinal axis by means of hand-wheel g , the two stops i can co-operate with the 10 two frame-stops k lying to the front of axial plane II—II of Fig. 2.

The operation of this tool-holder, according to Figs. 5-9 and their companion—Figs. 14-18, is the following:

15 Suppose horizontal planing starts at the forward run: holder a , according to Fig. 5, is hanging in its mean position and tends to swing in the direction of arrow x . The cutting tool b now pushes up against work-piece A, whereby tool- 20 holder a oscillates around pivot n in the direction of arrow y into an intermediate position shown in Fig. 6. Now, toward the end of the pendulous motion, face i_1 of stop i (Fig. 15) is pushing against corner k_2 and thus turns holder 25 a for the amount of angle α around its longitudinal axis into the final and working position of Figs. 7 and 16, when stop i has entered the recess k_2 . Check-face p_1 now is abutting solidly and squarely against the counter check-face q_1 30 of the frame-opening so that cutter b then is secured in its correct setting of the clearance-angle α against a further turning about and pendulous motion. Springs f (Figs. 1 and 2) damper the stopping motion. In the position of 35 Figs. 8 and 17 tool b is getting off the work-piece A, thus releasing the pressure of faces p_1 and q_1 against each other and thus also releasing springs f . Edge i_1 (Figs. 9 and 18) now pushes up against corner k_1 , thus turning tool-holder a back about 40 its longitudinal axis into the mean position of Figs. 5 and 14, with springs f supporting this return movement. The play now is reversed in a direction opposite to that of the initial forward run, with the other stop i co-operating with the 45 other stop k , whereby both stops lie to the same side of axial planes I—I and II—II.

I thus am able, with the tool-holder of the present invention in combination with its appurtenant devices, to plane from the left to the 50 right (Fig. 10) or vice versa (Fig. 11) without taking the tool out of its holder or resetting it; or, again, in a perpendicular direction either on the left (Fig. 12) or on the right side (Fig. 13); whereby much work of dismantling and resetting 55 the tool is eliminated, such work being necessary on planers with dead backward runs. A resetting with the planer in operation is possible with the present invention.

A principal advantage of the tool-holder at 60 hand lies in the arrangement of the pendulum-joint $e-n$ on its head in connection with the wide and substantial stop-faces p , q , p_1 and q_1 on its bottom-part, as hereby the bending stresses on the tool are kept small; the latter therefore does 65 not start oscillating and thus allows be the plan-

ing of relatively great chip-areas. The wide stop-faces easily take up the working pressure without giving rise to harmful turning moments in the tool and without subjecting the latter to torsional vibrations. All these factors combined makes for 5 a higher planing speed. The stops k and i render complicated steering mechanisms, with their many attending troubles, unnecessary, allowing me by way of the pendulous motion of the tool-holder to directly release the latter's setting onto 10 the clearance-angle.

I claim:

1. In a tool- or cutter-head for two-way planing a tool-holder in combination with a sliding 15 head, said tool-holder having a pendulous suspension around a horizontal axis of said sliding head at its top, a double-faced tool or cutter set in said tool-holder, said tool-holder being 20 mounted rotatively around its longitudinal axis, stop-elements in said tool-holder and counter-stops in said sliding head, the latter lying in the path of the former when said tool-holder swings about said horizontal axis.

2. In a tool- or cutter-head a tool-holder in combination with a sliding head, a tool-holder 25 revolvably suspended from a horizontal axis of said sliding head at its top, a double-faced tool or cutter set in said tool-holder, said tool-holder also being revolvably mounted around its longitudinal axis, stop-elements on said tool-holder 30 and counterstops on said sliding head, the latter lying in the path of the former when said tool-holder swings about said horizontal axis, and vertical stop-faces on two opposite sides of said tool-holder lying askew to each other and counter- 35 stop-faces on said sliding head tapering, relative to each other, outward from top to bottom.

3. In a tool- or cutter-head for two-way planing a tool-holder in combination with a sliding 40 head, said tool-holder being rotatively mounted on a horizontal axis of said sliding head at its top, a double-faced tool or cutter set in said tool-holder, said tool-holder furthermore being rotatively mounted about its longitudinal axis, 45 stop-elements on said tool-holder and counter-stops on said sliding head, the latter lying in the path of the former when said tool-holder swings about said horizontal axis, vertical stop-faces on two opposite sides of said tool-holder lying askew 50 to each other and counterstop-faces on said sliding head tapering outward from top to bottom with the distance between them being adjustable.

4. In a tool- or cutter-head for two-way planing a tool-holder in combination with a sliding 55 head, said tool-holder being rotatively mounted on a horizontal axis of said sliding head at its top, a double-faced tool or cutter set in said tool-holder, said tool-holder also being mounted rotatively about its longitudinal axis and adjust- 60 able for 180° around the latter axis, two stop-cams on said tool-holder and four stop-elements on said sliding head.

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