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1,459,206

H. H. HARDINGE

PLANE

Filed June 14, 1920

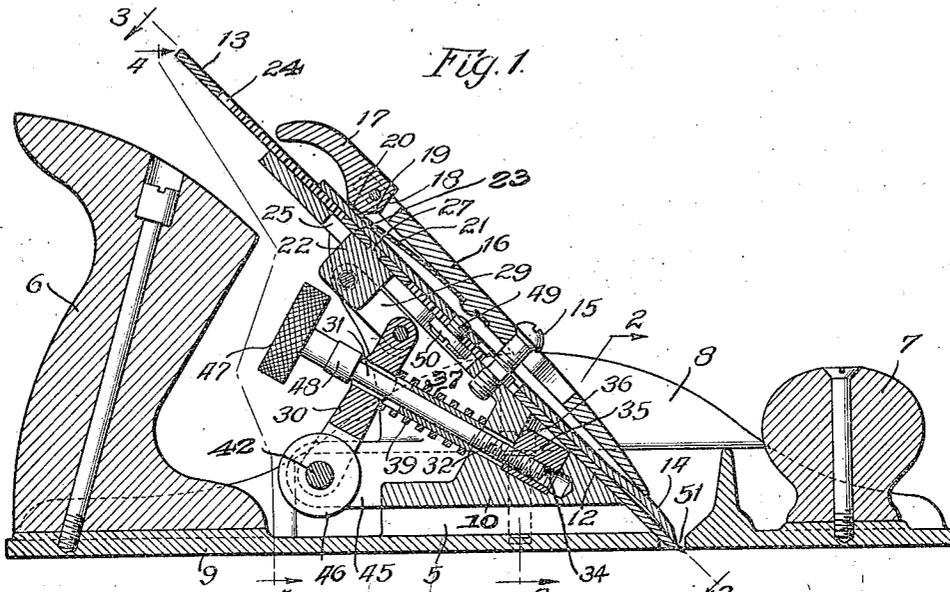


Fig. 1.

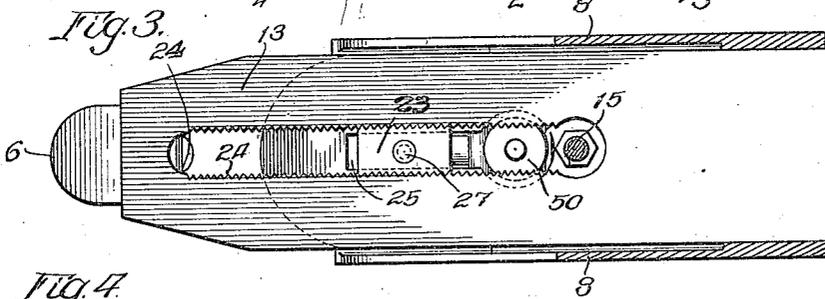


Fig. 3.

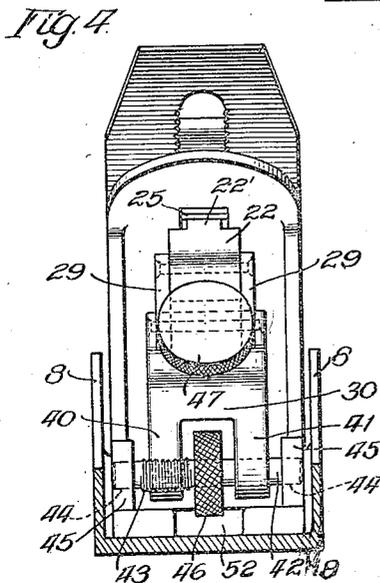


Fig. 4.

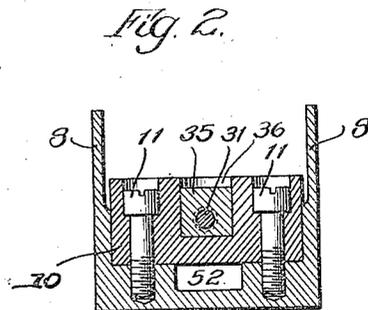


Fig. 2.

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# UNITED STATES PATENT OFFICE.

HENRY H. HARDINGE, OF CHICAGO, ILLINOIS.

PLANE.

Application filed June 14, 1920. Serial No. 388,771.

*To all whom it may concern:*

Be it known that I, HENRY H. HARDINGE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Planes, of which the following is a specification.

This invention relates to wood working planes but more particularly to the iron jack type intended for use in interior finishing, cabinet making, and other classes of high grade work in which uniformity and accuracy of cut is essential.

The primary object of this invention is to provide a plane which is simple and substantial in construction, efficient in operation, easy to adjust, and comparatively inexpensive to manufacture.

Another important object is to provide means for fine and accurate adjustment of the blades both longitudinally and angularly.

Further objects are to facilitate assembly and removal of parts; to permit the blade after adjustment to be removed from the body of the plane and reinserted therein without requiring readjustment; to eliminate lost motion between the blade and the body; and to compensate for shortening of the blade due to repeated grinding.

In planes of a similar character in use at the present time, the longitudinal adjustment of the blade is procured through an arm pivotally mounted intermediate its ends on the frog. The upper extremity of such arm works in a slot through the blade and engages with an opening in the cover. The lower extremity of this arm is operated by an adjusting screw. Thus it will be readily seen that the adjustment is obtained through the cover so that when the blade is removed from the cover for honing, the adjustment is lost. Likewise there is considerable lost motion at the cutting edge as the blade fits loosely in the body of the plane.

The angular or lateral adjustment of the blade has heretofore generally been procured in this type of plane by a pivoted lever which fits more or less loosely in a slot in the blade and readjustment of the blade is necessary every time such blade is removed. Furthermore accurate angular adjustment is difficult to obtain with this structure.

In the present invention, the blade is pro-

vided with a longitudinal slot having a serrated edge to receive and engage a correspondingly serrated pivoted and elongated adjusting block which completely controls the movement of the blade both longitudinally and angularly without any lost motion at the cutting edge. The block is advanced for longitudinal adjustment by means of an adjusting screw co-acting therewith. A similar adjusting screw acting between the side walls of the body of the plane moves the block sidewise in either direction to provide angular adjustment for the blade. The longitudinal slot in the blade is of considerable length so that the blade may be advanced relative to the block and then moved into engagement therewith to compensate for the shortening of the blade by repeated grinding.

The cutting end of the blade preferably fits closely between the ends of the slot in the base of the body of the plane and the blade may be removed from the plane and replaced without disturbing the adjustment.

In order to facilitate the assembling and disassembling of the plane, I have mounted all the operating parts upon the frog. This permits these parts to be removed from the body of the plane completely assembled by merely loosening the screws securing the frog to the body.

The cover plate clamps the blade upon the frog in the usual manner but, to aid in the adjustment, I have provided a three-step binding cam so that the blade may be loose upon the frog or pressed against the frog but capable of free adjustment thereon or tightly bound thereon.

The many other objects and advantages of the invention will be readily evident from the following specification when read in connection with the accompanying drawings illustrating a selected embodiment thereof in a jack plane and in which:—

Fig. 1 is a central vertical section of the invention complete,

Fig. 2 is a section on the line 2—2 of Fig. 1,

Fig. 3 is a section on the line 3—3 of Fig. 1,

Fig. 4 is a section on the line 4—4 of Fig. 1.

Referring to the drawings, the selected embodiment of the invention is shown to comprise a body 5 provided with an operating handle 6 and a front grip or knob 7 secured thereto in the usual manner. Side

walls 8 are formed on the base 9 of the body 5 and between these side walls the frog 10 is secured by screws 11.

The frog 10 is provided with the usual inclined face 12 on which the blade 13 and cover 14 therefor rest. A binding screw 15 projects upwardly from the frog and is engaged by the usual clamping plate 16. A locking lever 17 is pivotally secured to the upper end of the clamping plate and is provided with three binding faces 18, 19 and 20 located at different radial distances from the pivot of the locking lever. When the face 18 is in engagement with the flat spring 21 interposed between the lever and the cover the clamping plate rests loosely on the cover. When the lever is adjusted to cause face 19 to engage the spring a slight pressure is produced on the cover plate which permits ready adjustment of the blade but prevents free movement thereof. Adjusting the lever to the position shown in Fig. 1 with face 20 in engagement with the spring tightly binds the blade upon the face of the frog.

The blade is adjusted longitudinally on the inclined face of the frog by means of a block 22 which carries a plate 23 with serrated edges to engage the corresponding serrations on the edges of the longitudinal slot 24 in the blade. This adjusting block 22 has a reduced portion 22' which projects through slot 25 in the inclined face of the frog and the serrated plate 23 is of greater width than the slot and rests upon said face. A rivet 27 forms a pivotal connection between the adjusting plate and the block. Oppositely disposed links 29 connect the block 22 with the upper extremity of the adjusting member 30. An adjusting screw 31 passes freely through this member 30 and its lower threaded end 32 likewise passes freely through the body of the frog and engages the tapped hole 34 in the cylindrical block 35 seated in a recess 36 in the frog. A sleeve 37 is provided on the screw 31 between the member 30 and the frog, and a coiled spring 39 is arranged on this sleeve.

The lower extremity of the adjusting member 30 has formed thereon depending perforated lugs 40 and 41 through which passes the lateral adjusting screw 42 which forms a pivot for said member and has a threaded portion 43 fitting within the tapped opening in the lug 40. The opposite extremities of this adjusting screw extend through openings 44 in rearwardly projecting lugs 45 of the frog and they closely abut the inner faces of the side walls 8 of the body of the plane. A milled head 46 is fastened upon the adjusting screw 42 between lugs 40 and 41 for operating the screw. A similar milled head 47 is secured upon the upper extremity of the adjusting screw 31 above the collar 48 thereon. The cover 14 and the blade 13 are secured together by a

screw 49 provided with a large head 50 lying within the enlarged lower end of the slot 25 in the inclined wall of the frog.

The blade 13 is advanced longitudinally by turning the head 47, causing the adjusting screw 31 to move longitudinally and rocking the adjusting member 30 forwardly on the adjusting screw 42 which forms a pivotal mounting therefor. This forward rocking of the member 30 carries the block 22 forwardly and thereby moves the blade downwardly on the inclined face of the frog, the serrated plate 24 on this block being in locking engagement with the serrated edges of the blade. When the head 47 is rotated in reverse direction, to move the adjusting screw 31 rearwardly, the adjusting member will be rocked rearwardly by the spring 39 and the blade will be moved upwardly on the inclined face of the frog.

To angularly or laterally adjust the blade, the head 46 is turned in the proper direction to cause a corresponding lateral movement of the adjusting member 30, due to the engagement of the threaded portion 43 of the screw 42 with the tapped hole in the lug 40. The screw 42 is prevented from longitudinal movement by its engagement with the side walls 8. I do not consider it necessary to make threaded engagement between the screw 42 and lug 41 but prefer to provide a neat fit to produce a firm two-point support for the adjusting member 30. The opening in this member through which the screw 31 passes is of sufficient size to permit the small relative angular movement which takes place when the blade is advanced, and also the lateral movement of the member 30 relative to the screw 31 when the member is moved laterally for sidewise or angular adjustment. The upward projection 22' of the block 22 is sufficiently smaller than the slot 25 in the frog so that the block 22 and the serrated plate 24 secured thereto may move laterally with the member 30 and thus move the upper portion of the blade laterally. The lower or cutter end of the blade 13 fits substantially snugly between the end edges of the transverse slot 51 in the base of the body and this prevents lost motion at the cutting end of the blade in adjusting the blade. On account of the pivotal connection between the plate 23 and the block 22, this plate is free to swing angularly with the blade. As the blade is worn away by repeated grinding, compensation therefor is procured by moving the adjusting screw rearwardly in the manner described, lifting the blade clear of the serrations on the block 24, advancing the blade the desired amount, and then placing the blade upon the frog. The serrations on the block will now engage a new set of serrations on the blade. This may be repeated as often as necessary and thus one blade may be used for a long period.

Thus it will be seen that the blade is easily and accurately adjustable both longitudinally and laterally or angularly and there is no opportunity for play or lost motion between the parts. The lateral adjusting screw permits accurate angular adjustment and all adjustment is transmitted to the blade by the serrated plate 22. When the blade is removed from the plane for honing, the plate 22 remains fixed and no readjustment is necessary when the blade is returned. This is done in the usual manner by placing the plane on a smooth surface, inserting the blade in the slot 51 with its cutting edge resting upon said surface, and then dropping the blade upon the frog. The serrated edged slot 24 will engage the serrated plate 23 in the adjustment previous to the removal of the blade. The frog with all the operating parts thereon may be removed by merely unscrewing the screws 11 which secure it to the body or stock of the plane. I have formed a longitudinal channel 52 in the base of the body in order to lighten the weight of the plane. The spring 39 is constantly under tension between the frog and the adjusting member and takes up all lost motion longitudinally of the blade and compensates for wear on the screw 32 and nut 35.

I am aware that changes in the form and construction and proportion of parts may be made without departing from the spirit or

sacrificing the advantages of the invention and I reserve the right to make all such changes as fairly fall within the scope of the following claims.

I claim:

1. A plane comprising a body, a frog having an inclined upper wall provided with a longitudinal slot therein, a longitudinally slotted blade resting on said inclined wall, an adjustable block projecting through the slot in said frog and secured to said blade, an adjustable member pivoted at one end to said frog, links connecting the free end of said adjusting member to said block, and means for moving said adjusting member to effect longitudinal and lateral adjustment of said blade.

2. A plane comprising a body, a frog secured thereto, a blade resting on said frog, a cover secured to said blade, a binding screw seated in said frog and projecting through openings in said blade and cover, a locking plate resting on said cover and engaging said binding screw, and a locking lever carried by said locking plate and co-acting with said lever to lock said blade upon said frog, said lever being pivotally mounted on said locking plate and having three operating faces at different radial distances from its pivot to provide different binding pressures on said blade.

HENRY H. HARDINGE.