No. 675,121. Patented May 28, 1901.

W. H. WELSH.

COMBINED MITERING AND LEAD AND RULE CUTTING MACHINE.

(Application filed July 30, 1900.)

(No Model.) 2 Sheets—Sheet 1.

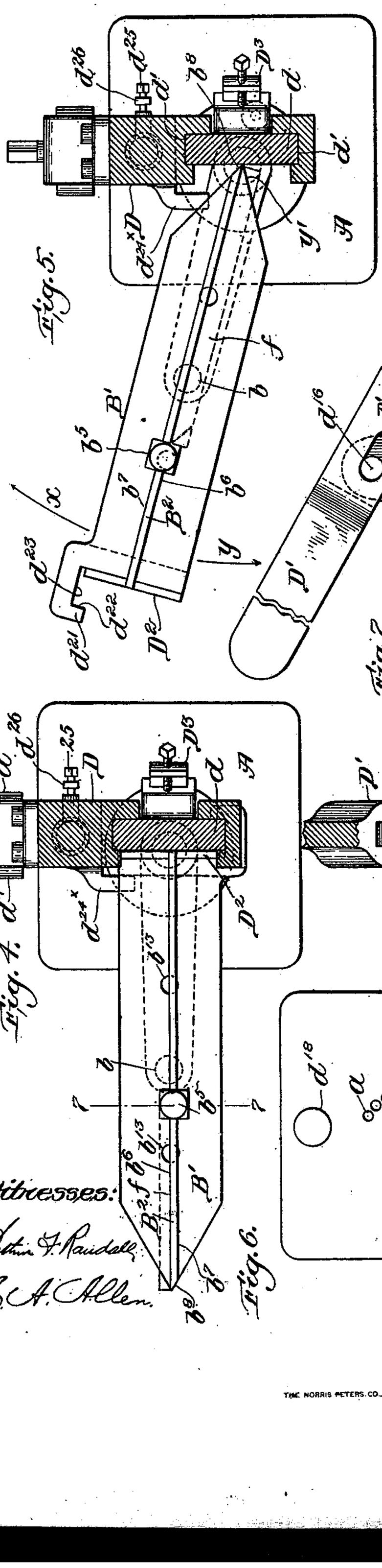

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Fig. 8.

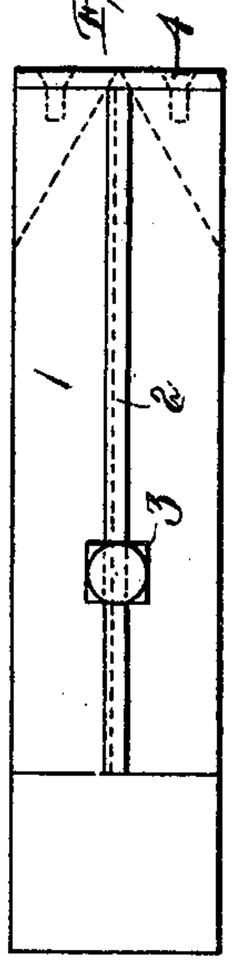


Fig. 9.

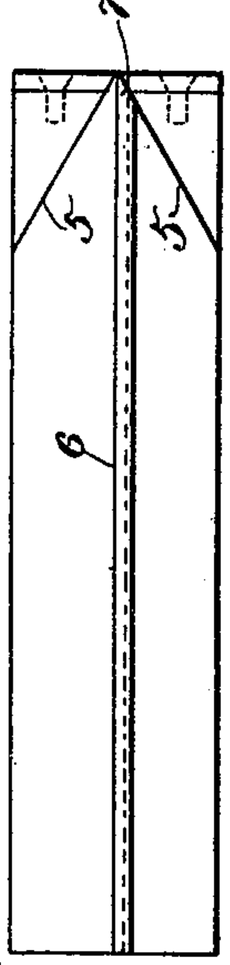


Fig. 11.

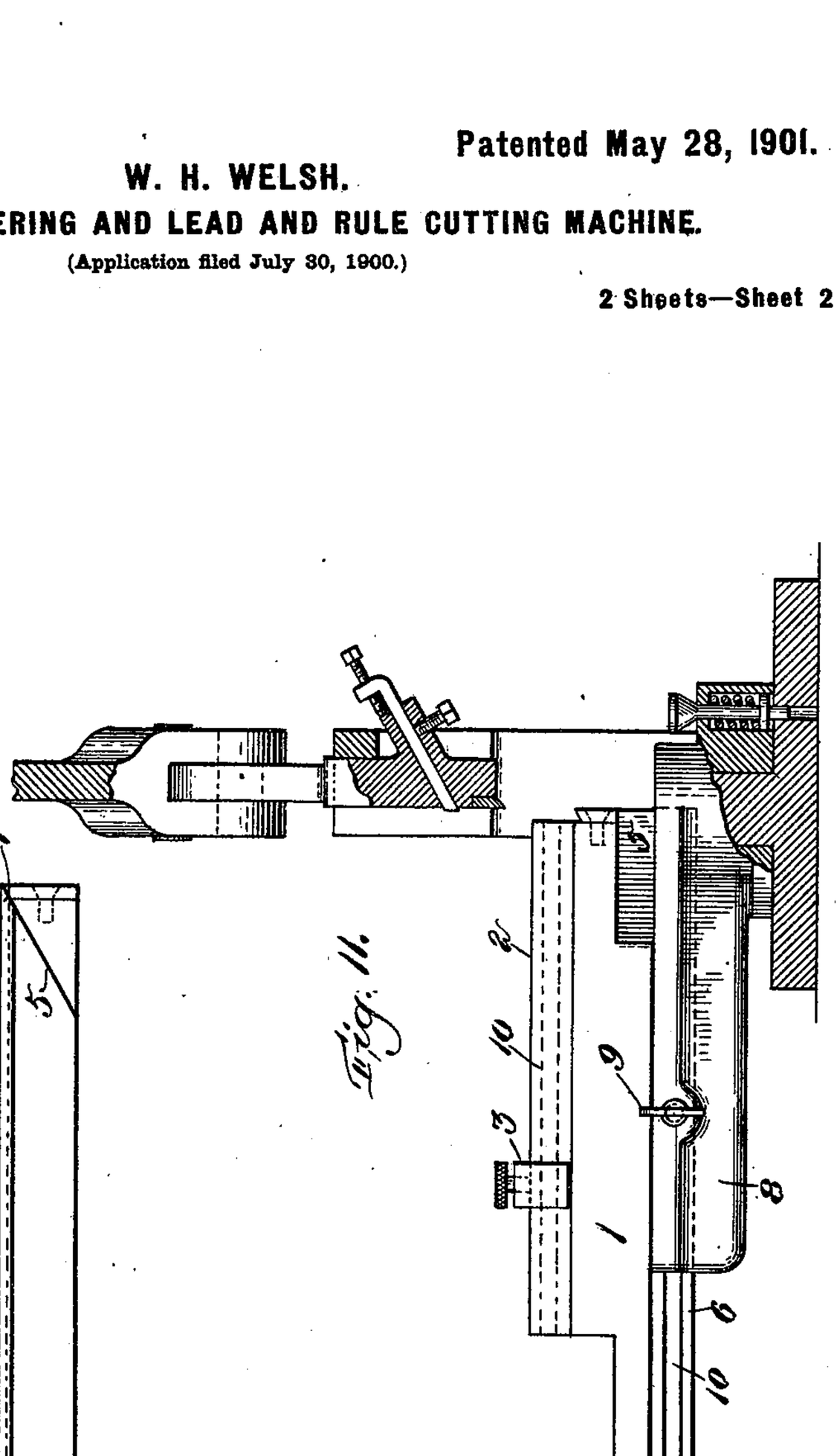
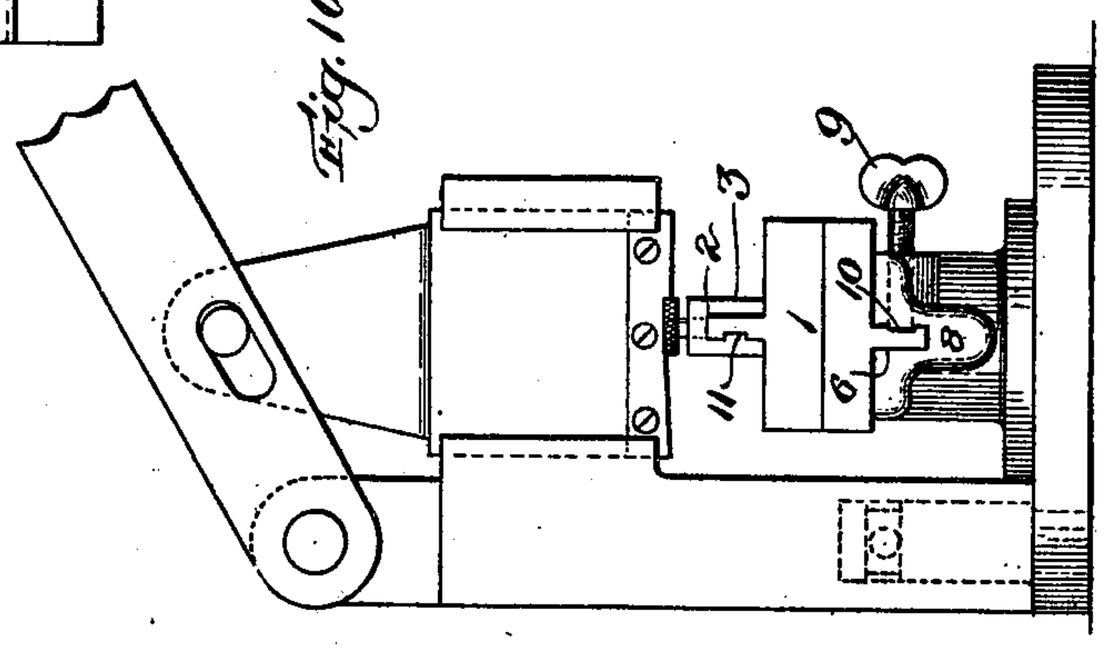


Fig. 10.



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UNITED STATES PATENT OFFICE.

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COMBINED MITERING AND LEAD AND RULE CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 675,121, dated May 28, 1901.

Application filed July 30, 1900. Serial No. 25,244. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WELSH, a citizen of the United States, residing at Medford, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in a Combined Mitering and Lead and Rule Cutting Machine, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a side elevation, partly in section, at line 1 1 of Fig. 2 of my new combined mitering and lead and rule cutting and bending machine. Fig. 2 is a front or head end elevation of said machine. Fig. 3 is a side elevation of the head of the machine and shows more fully the lead or rule bending mechanism with which the oscillating head is provided. Fig. 4 is a top plan view, partly in section, at line 4 4 of Fig. 3. Fig. 5 is also a top plan view at said line 4 4, but shows the lead and rule support in mitering position instead of the cutting position, wherein said support is illustrated in Fig. 4. Fig. 6 is a top plan view of the base of the machine and shows the stop-holes with which said base is provided to receive stop-pin in the bracket which carries the lead and rule support. Fig. 7 is a sectional detail at line 7 7 of Fig. 4. Figs. 8, 9, 10, and 11 illustrate a modified form of my compound machine, Fig. 8 being a top plan view of the reversible work-support with its transverse cutting side uppermost. Fig. 9 is a top plan view of the reversible work-support with its mitering side uppermost. Fig. 10 is a front end view of the modified machine, the lead-cutting side being uppermost. Fig. 11 is a side elevation, partly in section, of the modified machine with the lead-cutting side of the work-support uppermost.

The object of my invention is to combine in one machine both a mitering apparatus and a lead and rule cutting apparatus.

In the drawings illustrating the principle of my invention and the best mode now known to me of applying that principle, A is the base of the machine and supports both the vertical oscillatory bracket B and the vertical oscillatory head D.

Bracket B is provided with the horizontal lead and rule support B′, which is pivotally mounted on the outer free end of bracket B, conveniently by means of the pin *b*, which projects downwardly from the under side of support B′ and enters a suitable socket therefor in the free end of the bracket. The under side of the support B′ needs to be firmly supported (during the mitering and cutting operations) on the bracket B, and is therefore, in the present form of my machine, provided on each side of its pivotal connection with the bracket with a boss b', which is adapted to rest on the boss b^2 on the upper surface of bracket B′. I refer to this detail of construction for the mere purpose of showing the rigidity of the support during the mitering and cutting operations, this rigidity being obtainable in other ways, as will be plain to all mechanics. Support B′ is provided on its upper surface with a lengthwise-extending rib B^2, provided, preferably along one of its sides, with a groove b^3 to receive a horizontal tongue of the adjustable abutment b^4, which is slidable along the rib B^2 and held in adjusted position by the set-screw b^5, which passes through the top of the abutment b^4 and impinges the upper edge of rib B^2. A sectional detail of this adjustable abutment, mounted on the rib B^2, is shown in Fig. 7. The adjustment of the slidable abutment may of course be effected in various other ways. The abutment b^4 projects on each vertical side of the rib B^2, which is mounted, preferably, with its longer side b^6 at the central lengthwise axis of the support, the shorter side b^7 of rib B^2 having its inner end beveled at b^8. The purpose of the projection of the abutment on the vertical side of the rib B^2 is to enable it to be used as an abutment for any stock operated on at either side of the rib, either in the mitering or cross-cutting operations. The purpose of having the beveled inner end b^8 of the rib B^2 beveled rearwardly, as shown, from the central lengthwise axis of the support B′ is to permit adjustment of support B′ in the direction of arrow *x*, Fig. 5, without bringing in a vertical corner of the rib B^2 against the flat inner wall of the vertically-reciprocatory mitering-knife D^3, and consequently the inner end of side b^7 of rib B^2 is beveled off at b^8, or, in other

words, made cornerless. The rule *f* to be mitered is held by the hand of the operator edgewise against side b^6 of rib B^2, as shown in dotted lines in Fig. 5, the rear or outer end of the rule being against the abutment b^5. It will be understood by those skilled in the art that the front or inner end of the rule to be mitered will project slightly beyond the apex of the rib, so that the inner end of the rule to be mitered will stand at any desired angle to the face of the mitering-knife. If now the tail of the support B′ be moved in the direction of the arrow *y*, the inner end of the rule to be mitered will be brought into the desired position with reference to the mitering knife or cutters D′. The support B′ will then be locked in this desired position by some convenient locking device—such, for example, as the spring-controlled pin b^9, mounted in the recess b^{10} on the flange b^{11} of bracket B. This pin b^9 is adapted to enter one of the series of pin-holes *a* on the upper surface of base A, and when so entered holds the bracket in adjusted position. The pivotally-attached support B′ is held rigid on the bracket B by any suitable locking device—such, for example, as the spring-controlled pin b^{12}, mounted in bracket B and adapted to enter either one of the pin-holes b^{13} with which the under side of support B is provided on each side of its pivot connection with the bracket. The locking-pin mechanisms referred to are alike. Any suitable locking mechanisms may be used for securing the support B′ in position on the bracket and for securing the bracket in place on the base. In the present construction each pin (b^9 or b^{12}) is provided within its chamber with a projection b^{13}, between which and an opposed wall of the chamber a coiled spring b^{14} is mounted, so as to tend to keep the inner ends of the locking-pins projecting from the parts that carry them. The locking-pin b^9 on the flange of bracket B is forced into one of the holes *a*, arranged in a circular path on the base A, when the support is moved into the desired position, the pin being meanwhile held back by the operator. Bracket B is so mounted on base A as to be oscillated thereon in order to swing bracket B′ into various desired positions, and the present means of so mounting the bracket is to provide base A with an upwardly-projecting stud *a′*, which is received in a corresponding recess that opens on the under surface of the bracket. The bracket and base are held together conveniently by the screws a^2, the shank of which passes through the end wall a^3 of the bracket-recess, which receives stud *a′*, the inner end of the screw engaging in a circumferential groove in the stud, as shown in dotted lines in Fig. 1. To return now to the mitering operation, as above described one corner of the rule will be mitered at a desired angle, according to adjustment of support B′, and the bevel of this mitered end will incline from the front side of the rule rearwardly to the apex of the rib B^2. To correspondingly miter the other end of the rule, the rule is turned end to end on the support and the tail of the latter swung in the direction of the arrow *y* until the support B′ or (more specially stated) its rib B^2 stands at the desired angle to the front of the mitering-knife as that at which it stood when the end of the rule first operated upon was mitered. By again raising the mitering-knife above the unmitered end of the rule and continuing the operation of cutting the rule the latter is mitered, as indicated by the dotted line *y′*. The thickness of the rule dotted in Fig 5 is exaggerated in order to clearly illustrate the mitering operation.

Inasmuch as leads and rules are frequently required to be cut straight across and during the cutting operation are held flatwise on the upper surface of the support B′, (at one side or the other of the rib B^2, which then serves as an edge-guide for the lead or rule,) the locking-pin b^{12} and pin-holes b^{13} are so arranged as to lock bracket B and support B′ together in a right line with the locking-pin b^9 and pin-hole *a*, in which position of the parts the stationary cutting-blade D^2 (mounted on that end of carrier B′ which is opposite the mitering end of the carrier) is at right angles to the lengthwise axis of the carrier and in working line with the reciprocating cutter D^3, the carrier B′ having been turned end to end on its pivot in order to bring the lead and rule cutting end thereof next to head D. Consequently leads or rules placed flatwise on the upper flat surface of carrier B′ may be cut straight across, as usual in "lead-cutters."

The main object of my invention, commercially considered, is to combine in one machine both a mitering apparatus and a lead and rule cutting apparatus, and in the present embodiment of the several features of my invention I make one essential element of each of these two machines or apparatus an essential element of the combined machines. The element just referred to is the oscillating head D, which supports reciprocating block *d*, the edges of which are mounted in vertical guideways *d′* in head D, the reciprocatory block carrying the mitering-knife D^3 and the movable lead and rule cutter D^1. The head D, in addition to carrying these cutting members and block, also supports the brackets *d′* *d′*, the outer ends of which support the outer ends of the journals d^2 of the bending-rolls d^3, d^4, and d^5. Two of the bending-rolls d^3 and d^4 are mounted in the same horizontal plane, while the third roll d^5 is mounted in a different horizontal plane, with its lengthwise axis midway between the lengthwise axes of the rolls d^3 and d^4. The lower bracket *d′* is provided at its lower end with a horizontal outwardly-extending lug d^6, provided with a screw-hole to receive the vertical adjusting-screw d^7. The lower portion of this lower bracket *d′* is also provided with a vertical or lengthwise-extending slot *d* to receive the horizontal guide-screw d^9, which projects out-

wardly from the head D into the slot and is provided with a clamping-head which overlaps the outer margins of slot d^8. The shank of guide-screw d^9 is threaded, and the guide-screw is also used to clamp the bracket d^2 in adjusted position on the side of the head. This adjustment is obtained by manipulating the screw d^7, which is best provided with a rigid enlargement or thumb-piece d^{10} just above its lower end, which is socketed in base A and held therein by the check-screw d^{11} through a wall of base A′ into said socket, when it works in a circumferential groove d^{12} of screw d^7. The lower bracket d' is provided with an inner vertical arm d^{13}, provided with bearings for the inner ends of the journals of the lower rolls d^3 and d^4, and also with a bearing for the inner end of the journal of the upper roll d^5, the journal of the latter being extended on the outer side of the upper bracket d' to receive a crank whereby the roll d^5 is driven during the bending operation. As a great strain comes on the journal of the driven roll, I prefer in order to give it a solid bearing to prolong the inner end of the journal of roll d^5 and have it pass through a slot in the lower bracket into a coincident bearing-socket in the outer surface of head D, as shown by the dotted lines d^{14} in Fig. 2. By adjusting the lower rolls from or toward the driven roll the peripheries of the rolls are adjusted for rules and leads of different thicknesses as desired.

To head D the handle D′ is pinned at d^{15}, extending in the direction of slide-block d, with which it is operatively connected by the pin d^{16} from block d, the pin d^{16} playing in the elongated recess d^{17} with which the handle is provided. By moving the handle up and down the block d is reciprocated in head D. Head D is oscillatory, being mounted on the vertical pivot-post d^{18}, which rises from the upper side of base A and enters a vertical recess in the lower end of head D and is held therein by a horizontal check-screw d^{19}, that passes through a wall of said recess in the head and has its inner end in a circumferential groove d^{20} of the pivot-post d^{18}.

The purpose of making the head oscillatory is to give the mitering-knife D^4 the old and, as I think, desirable sidewise motion away from the end of the rule being mitered during the upstroke of the knife. There is some diversity of opinion among those skilled in the art as to whether it is better to have the mitering-knife or "shaver" returned in the path of its descent or to give it the sidewise motion during the upstroke; but I prefer the sidewise motion. However, in order to make my new machine suit all views I provide it with a set-screw d^{25}, which passes through a lug d^{26} on base A into a recess on an opposed wall of the head, so as to lock the head immovably on the base. Any desired locking device may of course be substituted for this set-screw, and if a non-oscillating head is desired the head may be made integral or otherwise made permanently fast to base A. Set-screw d^{21} or some suitable locking device is desirable when the head is made oscillatory in order that the head may be made non-oscillatory during the lead and rule cutting operations and held stationary for operation of the bending-rolls.

As in this preferred embodiment of my invention the head is capable of being oscillated during the upstroke of the knife-carrying block in the lead or rule cutting operation, it is desirable to provide supplementary guideways to receive the edges of the downwardly-moving knife-carrying block d after its lower end passes from the guideways d' in head D. This is in order to prevent the exposed portion of the block from springing outwardly away from the rule or lead as the cross-cutting knife D^4 engages the work, the block then tending to do so if its lower exposed end is not restrained. In the mitering operation when knife or cutter D^3 is in use I prefer, as stated, to move the head containing the knife or shaver D^3 after each cut sidewise from the vertical end of the rule being mitered; but when a lead or rule is to be cross-cut and operated on flatwise between the complementary blades or cutters D^2 and D^4 it is better that the movable cutter D^4 should be restrained from any outward movement. Consequently I provide the cutter end of support B′ with a hooked extension d^{21}, which when the cutter end of support B′ is adjacent to head D has its inner walls d^{22} and d^{23} in the path of the sides of the descending block d. Block d is provided with a depending lug d^{24}, which first passes into the bearing or guide formed by said walls d^{22} and d^{23} before knife D^4 engages the work, and then as the block d descends its edge above the lug d^{24} rides in and is steadied by the inner walls of the hook, which prevent outward movement of the lower end of the descending block and so keep the movable knife or cutter D^4 in good working position with the stationary knife or cutting end wall D^2 of support B′. To further steady the support B′ when its cutter end D^4 is adjacent to the head, I provide head D with an inwardly-projecting hook-like lug $d^{24\times}$, that engages the rear side of the lug d^{25} on the under side of the front end of the work-support B′.

The mitering-knife or shaver is made lengthwise adjustable and clamped in inclined position preferably in the manner described and substantially as in old and familiar jack-planes and other cutting devices.

The great advantage of my new device is that it combines in cheap, simple, and compact form the essential working elements of a plurality of heretofore distinct machines. It will be plain to all skilled in the art that the machine described may be varied in many purely mechanical respects without departure from my invention, and I desire to be

understood as claiming each and every novel feature of my invention in the broadest legally permissible manner.

The reversible work-support, whether in the end-to-end form, adjustable form shown, or however otherwise reversible, is a wholly new element in machines in this art to the best of my information and belief.

In Figs. 8, 9, 10, and 11 I illustrate a modified form of my machine, the main feature of which is in making the reversible work-support reversible on its longitudinal axis instead of on the vertical axis.

In Fig. 8, 1 is the work-support; 2, the central guide-rib; 3, the adjustable abutment, and 4 the straight knife, with which in this modification the same end that carries the mitering-point is provided. It should be understood that the knife 4 in all forms of my machine may be an integral portion of the work-support, formed by suitably hardening the steel or other hard metal of which the work-support is formed; but preferably for economical reasons the transverse knife 4 is a piece of hardened steel fastened on the end of the work-support.

In Fig. 9, 5 5 are the rearwardly-extending inclines on the mitering side of the work-support, and 6 is the mitering-rib, the end of which is beveled at 7 for purposes already described in connection with the preferred form. Instead of turning the work-support end to end, as in the preferred form, I provide the bracket 8 with a lengthwise-extending groove adapted to receive either the rib 2 or rib 6 on the work-support, as desired, and in changing the machine from a lead or rule cutting machine into a mitering-machine simply remove the work-support and turn it on its longitudinal axis. A set-screw 9 through one side of the bracket 8 enters the longitudinal groove 10 of either rib 6 or rib 2, as desired. The grooves 10 receive the inturned fin or rib 11 with which one leg of the adjustable abutment 3 is provided. One abutment 3 answers for both ribs 2 and 6, being removed from one and placed on the other as desired. Consequently only one abutment is shown.

What I claim is—

1. The combination of a base; a head mounted thereon; a knife-carrying block mounted in guideways in said head; a plurality of knives carried by said block and projecting from the inner side thereof; means for reciprocating said block in the guideways; a reversible work-support having rearwardly-inclined sides at one end and having its other end straight across; a work-supporting rib extending lengthwise of a work-supporting surface of said support and beveled at its end which is between the rearwardly-inclined edges of the work-support; and means for supporting said work-support, on said base, in any desired working position with reference to the said block.

2. As a new article of manufacture, a reversible work-support for lead and rule cutting and mitering machines, said support containing a straight cutting member at one of its ends and having at one of its ends rearwardly-inclined edges, and also having a mitering-rib which has one of its vertical ends beveled.

3. In a lead and rule cutting apparatus, the combination of a head; a knife-carrying block sliding therein; a base in which said head is rotatably mounted; a bracket rotatably mounted in the apparatus; a reversible work-support provided with a mitering-rib and with a cutting member; means for operatively connecting the support with the bracket; and means for holding the bracket in adjusted positions.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. WELSH.

Witnesses:
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FRANCIS J. V. DAKIN.