(No Model.) 2 Sheets—Sheet 1.

W. R. FOX.

MITER CUTTER.

No. 422,517. Patented Mar. 4, 1890.

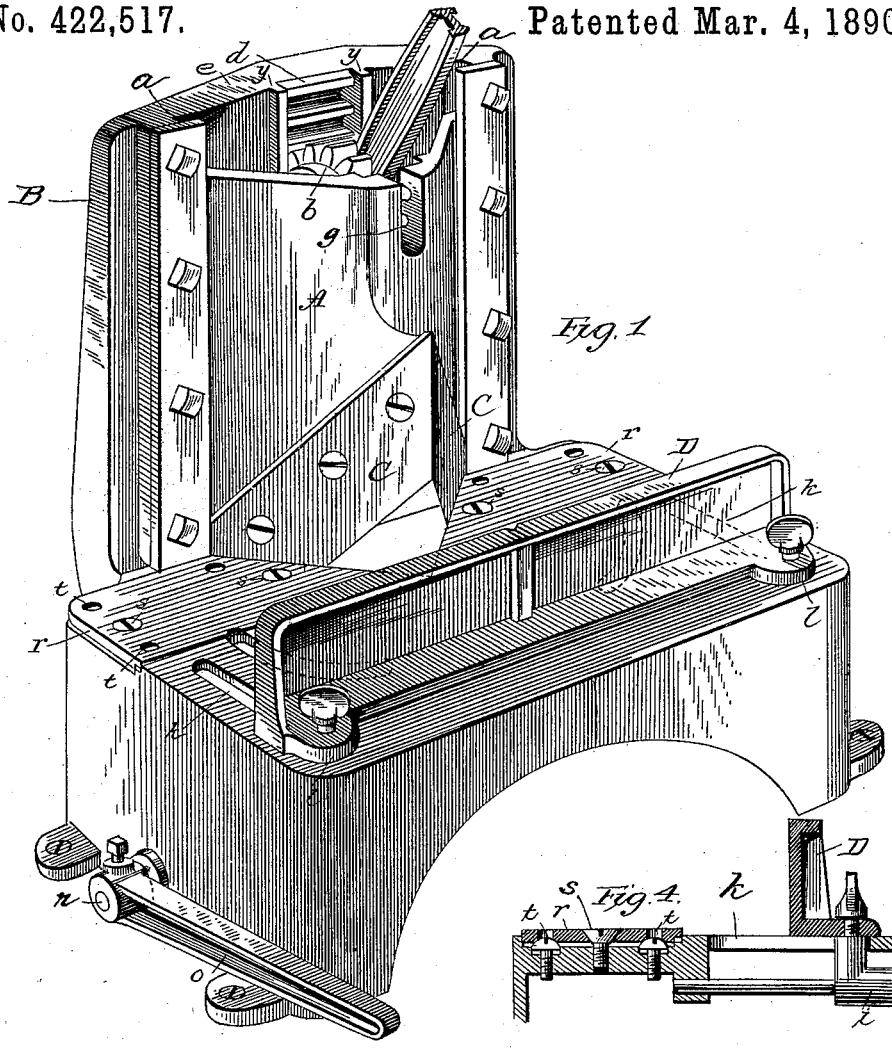

Fig. 1

Fig. 4.

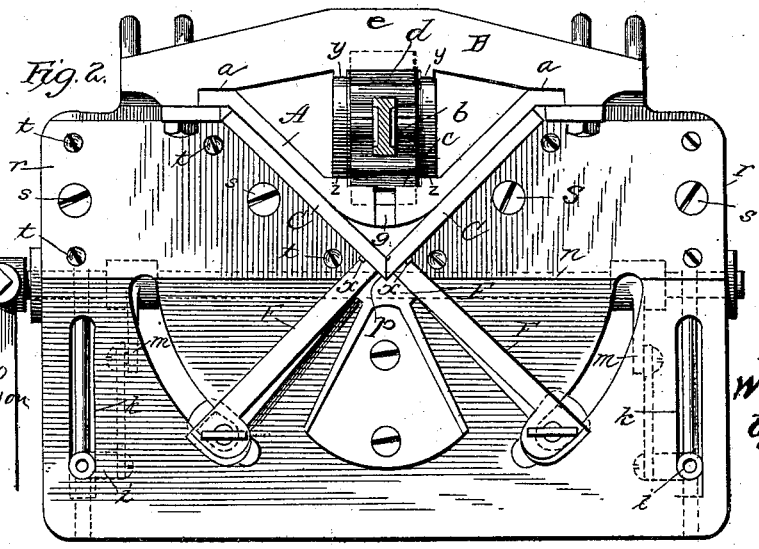

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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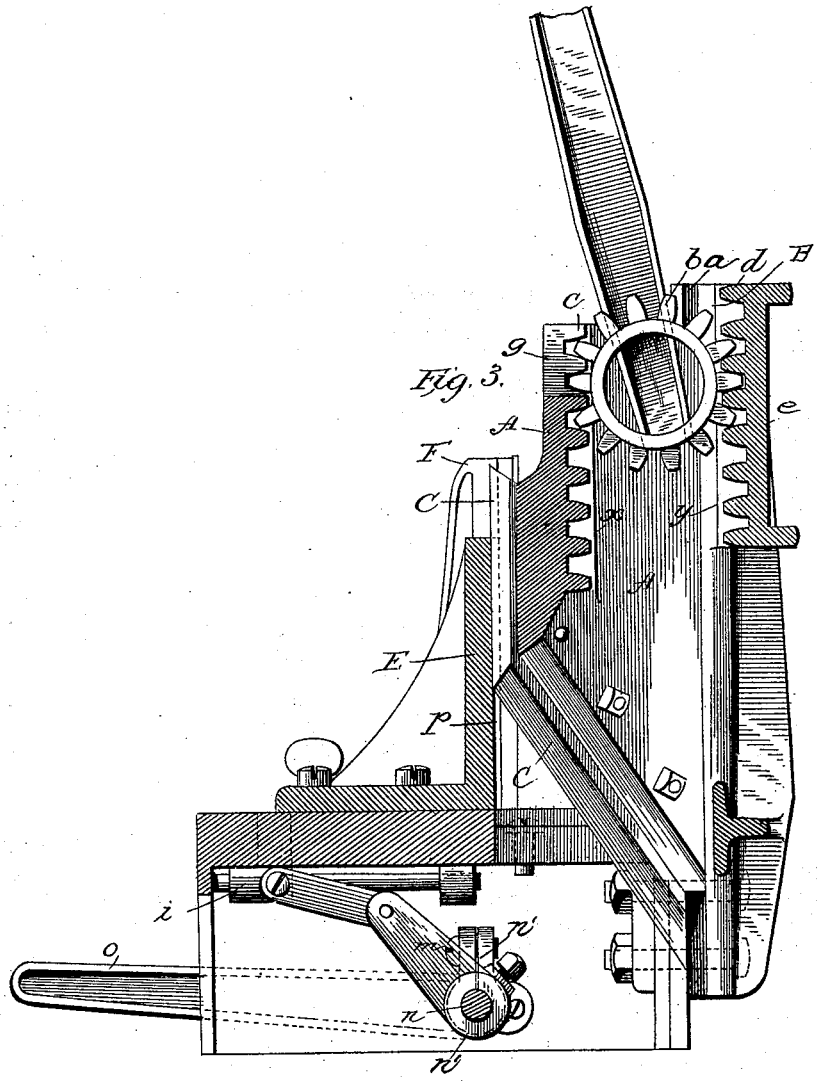
Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM R. FOX, OF GRAND RAPIDS, MICHIGAN.

MITER-CUTTER.

SPECIFICATION forming part of Letters Patent No. 422,517, dated March 4, 1890.

Application filed November 13, 1888. Serial No. 290,707. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. FOX, of Grand Rapids, in the county of Kent and State of Michigan, have invented a new and useful Improvement in Miter-Cutters; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention is an improvement in mitering-machines of that class in which a vertically-reciprocating knife is used with a pair of cutters arranged at approximately right angles to each other, with their front edges meeting and their cutting-edges inclining downwardly, so as to give a shear cut in the vertical reciprocation of the head.

I provide in my improved machine two different kinds of gages, one extending across the bed of the machine and capable of adjustment toward or from the knives, by means of which not only can the material operated upon be mitered, but entirely severed by a single cut if the material is not too heavy, or by a series of cuts if a single cut is not sufficient. Instead of this I may utilize the cutting-edges from each side, and in this case I use a central post or support alone, or with a gage on each side bearing against the post. When used in this connection, the operation of each cutting-edge is not essentially different from a horizontally-moving knife, such as that shown in Letters Patent granted me December 4, 1888, No. 393,970. I also provide in this machine for the close fitting of the mitered parts by an under or over cut, which object is obtained by inserting adjustable face-plates in the bed of the machine in line with the cutting-knives, these plates being adjustable at the ends nearest the knives or at the ends farthest from the knives, according to the requirement of the work.

In the drawings, Figure 1 represents a perspective view of my invention with the adjustable gage extending across the bed of the machine. Fig. 2 is a plan view of the machine with a central post and a gage on each side thereof. Fig. 3 is a central vertical section showing the means for reciprocating the knife-head. Fig. 4 is a section through the bed across the line of the cutters, showing the adjustable face-plates.

In the drawings the cutting-knives are shown as supported at an angle to each other upon a vertical reciprocating head A, which is supported in ways *a* in the frame B of the machine.

The table or base of the machine is of rectangular form, and has a V-shaped opening cut out of one of its longest sides to correspond to the shape of the knives or cutters, which are adapted, as hereinafter described, to be reciprocated in line with the said opening above and beneath the level of the table. The frame which supports the head A is composed of upright standards having strengthening-webs at top and bottom, and these standards extend some distance below the level of the table, being bolted to that side of the base which contains the V-shaped opening, the distance between the standards being equal to the widest part of the V-shaped opening. The inner faces of the standards forming a part of the frame are provided with strips of metal bolted thereto and overlapping a projecting part of the face, thus forming ways for the corresponding parts of the head A. These overlapping strips extend to the level of the table; but the ways do not stop here, being continued between inwardly-projecting portions of the standards and the sides of the base opposite thereto, as shown. Thus the head carrying the cutters is not only guided above the level of the table, but also in its movement below the level of the table, and it is obvious that it is important that it should be guided at this point, as much of the heavy work is done when the lower part of the head is below the surface of the table. This head A is given a vertical reciprocation by means of a gear *b*, which meshes in the teeth of racks *c d*, the rack *c* being formed in the rear central part of the head A and the rack *d* in the inner face of the upper connecting-web *e* of the frame of the machine. A suitable handle fits into a slot in the periphery of the gear, and the movement of this handle reciprocates the head vertically. The downward movement of the handle is permitted by a slot *g*, formed in the central upper part of the head A. Instead of being operated by hand, it will of course be understood that a treadle may be used or the machine driven by power.

The knives or cutters C C are secured to the angular faces of the head, with their upper edges meeting, their cutting-edges downwardly extending at an angle to the table of the machine, which has an angular opening formed in the front part, and the material to be operated upon, when the cutters are up, is laid across this opening in the path of the knives, and as these knives descend they sever the material or miter the end, according to the position the material occupies relatively to the knives.

In order to accurately gage the material in presenting it to the cutting-knives, I provide a horizontally-adjustable gage D, extending entirely across the bed of the machine. The ends of the gage are connected by means of screws to blocks *i*, carried upon stationary rods arranged beneath the bed of the machine, the ends of the blocks extending up through slots *k* a short distance from each end of the bed. Ears *l* on the rear of each end of the gage are placed in line with the screw-threaded openings of the block *i*, a thumb-screw securely fastening the gage in place. The blocks *i* have an angular projection extending to one side beneath the bed, and these projections support one end of pivoted links, the other ends of which are connected to arms *m*, which are secured by means of set-screws to a shaft *n*, operated by a handle *o* upon the outside of the machine. The shaft *n* has a friction-block encircling it secured to the base on which the machine is set, as shown at *n'*, and thus the parts can be held with more or less friction and the gage D made to withstand pressure applied to it through the action of the machine. It will thus be seen that by moving the handle *o* the oscillation of the shaft is communicated, through its arms and the links connected therewith, to the sliding blocks *i*, which are thus moved upon their supporting-rods, and in this manner the gage is adjusted back and forth relatively to the cutting-knives. When it is required both to miter and sever a piece of molding or other material, the gage is properly set and the material held against it, so that the portion to be cut is directly in the path of the knives.

In the downward movement of the knives a piece is removed from the material corresponding to the shape of the joined knives, and in case the material is too heavy to be severed at one movement it may be advanced after the knives have been moved upward and the second cut will remove more, and so on until it is completely cut. Both parts of the material will then be mitered in a corresponding manner, except that one is cut away to the right and the other to the left. In many cases, however, this double action of the cutting-blades is not required, and in order to enable the machine to be used accurately for simple mitering at any angle or to cut the material squarely I substitute for the gage D two gages—one for each knife—independent of each other, and provide a bearing against which the gages rest, as shown at E, which consists of a post secured to the bed by screws or other suitable means. The post E has two bearing-faces arranged at right angles to each other, with the line of junction in line with the joined edges of the cutters, and in order to bring the bearing-faces of the post within the line of cut of the knives I groove the post on its front edge, as shown at *p*.

The gages F F are substantially of the form shown in my patent referred to, and have an adjustable connection at their rear ends in curved slots which are formed with due regard to the bearing provided by the post E, as a center. The front ends of the gages are free, and in the adjustment one edge bears against the post and the other parallel edge bears against the knife and is in direct line with the edge of the opening in the bed, so that between it and the knife the material is cut with a shear cut. Instead of simply utilizing the post E as a support for the gages F F, these gages may be dispensed with in some classes of work and the post used alone to form a bearing or support for the material to be cut.

The gages F are provided with their front faces plane and with parallel sides at their end, the plane front face being approximately parallel to the face of the cutter. One side of the front of the gage has a bearing against the post E, and in order to keep the opposite parallel edge slightly away from the face of the knife, so as to prevent wearing-contact between the edge of the knife and the edge of the gage, I insert a piece of steel *x* in the upper part of one edge of the gage, extending slightly beyond its plane face, and this has the effect to prevent the wearing-contact referred to.

It will be understood that the gages may be held after they are adjusted properly by a connecting-spring between their forward ends and the post E, as in my patent referred to; but this is not essential, as the material being pressed against it will ordinarily keep it in place.

As is well known, when molding or other material is mitered, it is often desirable to form a perfect fit on one or more edges, and it is usual to form a miter on an angle from top to bottom, or vice versa, which thus cuts away from the general angle of the miter at the point where a close fit is not necessary, thus leaving the opposite edge or edges in condition to be fitted closely and accurately. In order to provide for this, I cut out a portion of the bed in line with the movement of the knives and on each side thereof from the angular opening in the center to the sides and insert adjustable bearing-plates *r*, which are held in place by screws *s* at each end. Beneath these plates, in line with the four

corners thereof, I place round-headed screws and provide the plates with openings in line with these screws, but of smaller diameter than the heads. Around these openings on the under surface of the plates I form convex bearings, adapted to receive and seat the heads of the screws. When it is desired, therefore, to cut a little more from the upper edge of the molding than from the lower in mitering, I simply loosen the screws *s* and then insert a screw-driver through the openings *t* at one end of the plate and unscrew the round-headed screws, which has the effect of lifting the end of the plate. This of course will form an incline toward the cutting-edge, and the result will be that not only will the knife cut according to its own angle and according to the angle of the gage, but will also cut the molding in an angle from the top thereof to the bottom, according to the inclination of the plate.

It will of course be understood that if it is desired to cut more from the bottom than the top the round-headed screws near the knives will be adjusted so as to incline the plate away from the knife.

Referring to Fig. 2, it will be observed that bearings *y z* project alongside of the racks in the web *e* and head, and the gear *b* has plain portions on each side of its cogged central portion in contact with these bearings. The gear *b* is simply held in place by its teeth engaging with the racks.

I do not claim, broadly, in this application a horizontally-adjustable gage extending entirely across the bed of the machine, with means for moving said gage connected to each end thereof.

What I claim is—

1. In a mitering-machine, a vertically-reciprocating head of angular shape, cutters carried thereby, a rack in the frame and a rack in the angle of the head opposite that in the frame, and a pinion interposed between the racks and meshing therewith, substantially as described.

2. In a mitering-machine, a vertically-reciprocating head of angular shape carrying the cutters on its lower end, a rack on its inner face in the angle of the said head, a rack on the frame opposite thereto, a pinion interposed between the two, and a handle for operating said pinion, said head having a slot in the upper edge in line with the movement of the handle, substantially as described.

3. In combination with a vertically-reciprocating head of angular shape carrying cutters, a post in line with the point of junction of said cutters and having bearing-faces extending to each side of the line of junction at right angles to the cutters, substantially as described.

4. In combination with a vertically-reciprocating head of angular shape carrying cutters, a supporting-post in line with the point of junction of the cutters, and an adjustable gage on each side of the post, the inner end of each gage bearing against the said post and the outer end being adjustable, substantially as described.

5. In combination with a vertically-reciprocating head of angular shape carrying cutters on its lower end, a removable supporting-post in line with the point of junction of the cutters, and an adjustable gage having one end bearing against the said post and the outer end adjustably secured to the bed-plate, substantially as described.

6. In combination with a vertically-reciprocating head of angular shape carrying cutters on its lower end, a removable supporting-post in line with the point of junction of the cutters, and removable gages adapted when in place to have one end supported by the said post, substantially as described.

7. In combination with a reciprocating head carrying cutters, a bearing-post, and an adjustable gage having a front face with parallel edges, with a portion of one edge of said face extending beyond the plane of the face of the gage, substantially as and for the purpose set forth.

8. In combination with a reciprocating head carrying cutters, a bearing-post and an adjustable gage having a front face with parallel edges, one side of said gage bearing against the post, and an inserted bearing-piece in a part of the gage edge opposite to that which bears against the post, substantially as described.

9. In combination with the vertically-reciprocating head carrying cutters, a post E, removably supported on the bed of the machine, said post having angular faces extending at right angles to the faces of the cutters and an angular groove in its front edge, and adjustable gages, one on each side of said post, substantially as described.

10. In combination, a vertically-reciprocating head carrying cutters, and an adjustable bearing-plate for the material to be acted upon, said bearing-plate being adjustable at each end, substantially as described.

11. In combination with a vertically-reciprocating head carrying cutters, a bed-plate, portions of said bed-plate on each side of the line of the cutters being adjustably secured so as to be capable of adjustment at one end or the other, substantially as described.

12. In combination with a vertically-reciprocating head carrying cutters, bearing-plates upon each side of the path of the cutters, said bearing-plates having an adjustable connection with the table of the machine at each corner, substantially as described.

13. In combination with the cutter-head, a central post, adjustable gages on each side of said post, and adjustable bearing-plates adapted to form an angular bearing for the material operated upon, substantially as described.

14. The combination, in a miter-cutter, of a

table or base having a V-shaped opening therein, vertical standards extending from said base, said standards extending below the level of the table, and guiding-ways extending the whole length of the standards and formed between the standard and the base below the level of the table and between the standard and vertical plates above the table, substantially as described.

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

WILLIAM R. FOX.

Witnesses:
ESTELLE H. PROVIN,
L. J. PROVIN.