(No Model.) 2 Sheets—Sheet 1.

F. H. VAN HOUTEN.

MOLDING MACHINE.

No. 480,444. Patented Aug. 9, 1892.

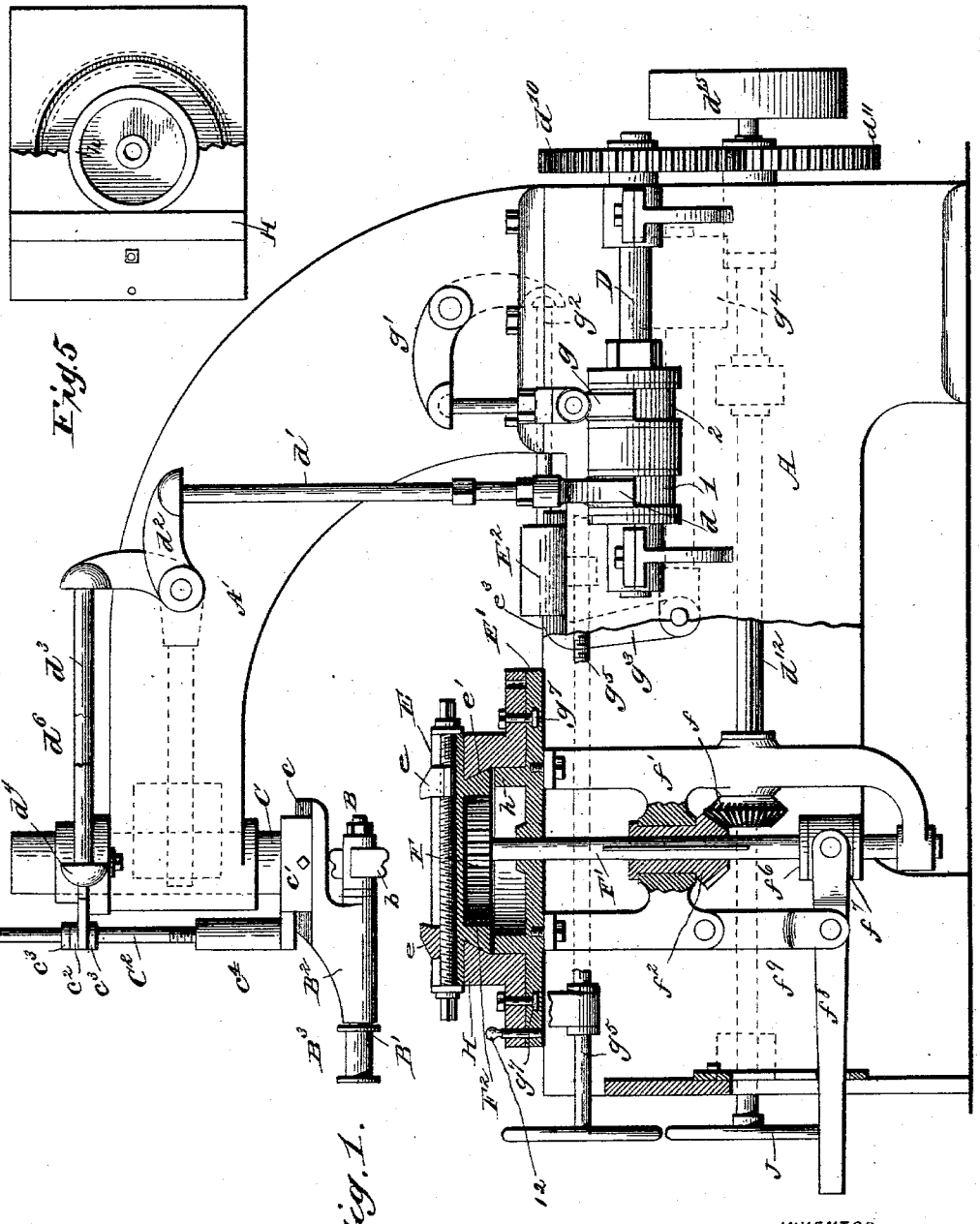

Fig. 5

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

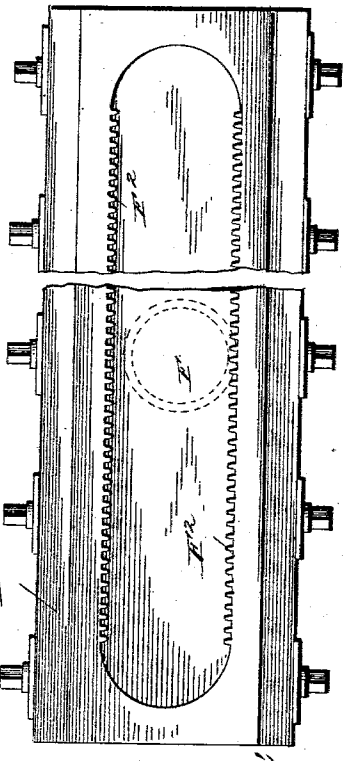


Fig. 4.

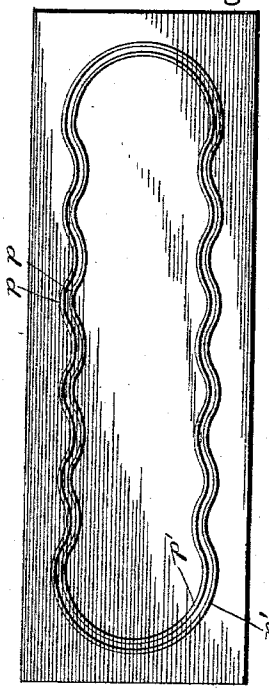
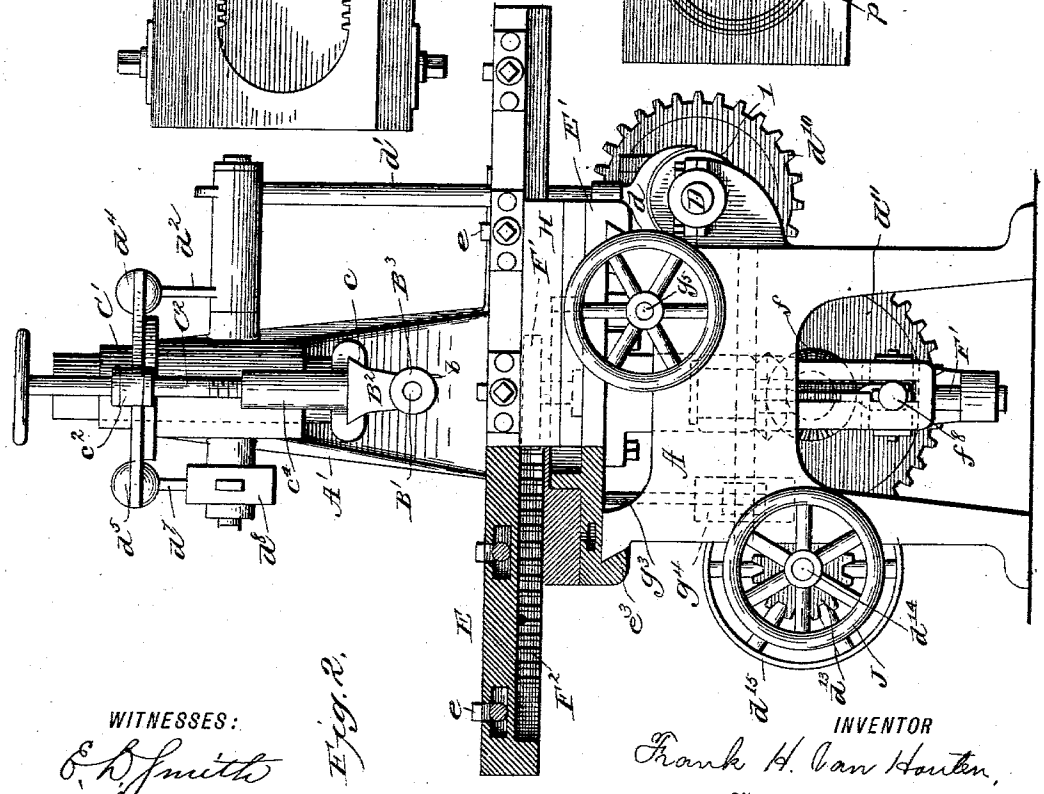


Fig. 2.



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UNITED STATES PATENT OFFICE.

FRANK H. VAN HOUTEN, OF MATTEAWAN, NEW YORK, ASSIGNOR TO CHARLES L. GOEHRING, OF ALLEGHENY, PENNSYLVANIA.

MOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 480,444, dated August 9, 1892.

Application filed December 23, 1890. Serial No. 375,611. (No model.)

To all whom it may concern:

Be it known that I, FRANK H. VAN HOUTEN, of Matteawan, in the county of Dutchess, State of New York, have invented certain new and useful Improvements in Molding-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to that class of molding-machines for producing ornamental and other designs and figures upon the surface of the material by the conjoint action of oscillatory reciprocating cutter-heads and the feed mechanism, the latter acting upon the material to advance it beneath the oscillatory reciprocating cutter-head, as disclosed in Patents Nos. 394,763 and 394,767, granted to C. L. Goehring December 18, 1888.

In machines of the class referred to as heretofore constructed the oscillatory reciprocating motions, as between the material and the cutter-head, necessary to the production of finished moldings have been effected by giving to the cutter-head a reciprocating motion laterally of the feed movement and simultaneously therewith oscillating the cutter-head in a direction and degree corresponding to the reciprocating movements communicated to the cutter-head. In order to produce and accommodate this compound oscillatory reciprocating movement of the cutter-head, complex and expensive mechanism is required in order to provide for the necessary adjustments to accommodate different designs and to insure the steady running of the cutter-head and prevent chattering.

My invention further consists in the organization of a machine for producing complete moldings for panels, &c., upon the principles laid down in the said Goehring patents, which I am enabled to do more economically and readily by the aid of the laterally-movable work-support, acting in conjunction with the longitudinal feed and oscillatory cutter, than can be effected when the oscillatory reciprocating motions are confined to the cutter-head.

The said invention will first be described, and the novel features pointed out in the claims.

In the drawings, Figure 1 is an end elevation, partly in section, of a paneling-machine embodying my improvements. Fig. 2 is a front elevation, partly in section. Fig. 3 is a detail view showing under side of feed-table. Fig. 4 is a diagrammatic view representing a completed design or panel. Fig. 5 is a plan view of turret and its pivotal support, the turret being partially broken away and the carriage removed.

Similar letters and numerals of reference in the several figures indicate the same parts.

The letter A designates the frame of the machine, of any desired or approved construction, provided with an overhanging frame or arm A′ to accommodate and sustain the oscillating cutter-head.

B is the cutter-head, provided with suitably-shaped bits or cutters *b* and secured upon an arbor B′, mounted in an arbor-frame B^2 and carrying a driving-pulley B^3. The arbor-frame B^2 is pivotally supported in the arm A′, so as to be capable of an oscillatory movement about a vertical axis, as by securing it in or to a vertical post C, mounted in bearings in or on the arm A′. The connection between the arbor-frame B^2 and post C is one permitting of the lateral adjustment of the cutter-head with respect to the axis of oscillation, which may be effected by forming ways *c* upon the post C and fitting the arbor-frame to slide upon said ways, suitable means—such as a bolt *c*′—being employed for clamping or holding the arbor-frame in adjusted position. Upon the post C is fitted a collar C′, which is connected to the post in a manner to permit longitudinal motion of the one with respect to the other, but at the same time compels them to rotate in unison. Such a connection may be formed by a groove in the one and a spline or key on the other. Through an arm c^2, projecting from collar C′, is passed a rod or screw-shaft C^2, held from longitudinal movement in said arm by collars c^3 or equivalent means, its lower screw-threaded portion taking into an internally-threaded hub or projection c^4 on the lower portion of the post C, by which means the post can be adjusted longitudinally with respect to the frame and

collar C′ to determine the elevation of the cutter-head above the work-support.

The following means are provided for effecting and controlling the oscillatory movements of the cutter-head and its arbor: A shaft D, mounted in bearings on the frame A, carries an eccentric or pattern cam 1, operating upon a yoke or saddle d to give motion to a rod d', which latter in turn acts through a bell-crank lever d^2 and rod d^3 to transmit motion to the collar C′ and post C, the outer end of said rod d^3 being in engagement with a projection or bearing d^4 on the collar. On the side of the collar C′ opposite the bearing d^4 is a bearing d^5 for thrust-rod d^6, the latter being interposed between said bearing d^5 and a lever d^7, carrying an adjustable weight d^8. The weight acts in opposition to the thrust of the eccentric or cam 1 and holds all the parts pressed toward the cam, thus preventing lost motion and compelling the post and the cutter-head borne thereby to follow the motions inaugurated by said cam or pattern surface.

As will be obvious, other and equivalent devices may be employed for transmitting motion from the pattern-surface to the post to effect the oscillatory movements of the cutter-head; but the mechanism shown has proved well suited for the purpose, hence it is illustrated as the preferred embodiment.

It will be noted that, aside from the movements for adjustment and the rotation of the arbor and cutter-head, provision is made for automatically effecting a movement of the cutter-head in but one direction—*i. e.*, about an axis perpendicular to the arbor and intersecting the cutter-head thereon. The lateral motions necessary to the production of the designs and to accommodate the varying angular positions of the arbor with respect to the actual line of direction of the feed movement are effected through the medium of the work support or table over which the material is fed or by which it is carried.

As in panel-work it is desirable that the blank board to be ornamented should be held firmly while being operated upon and should be capable of moving in either direction under the influence of the feeding mechanism, I have shown a feeding device provided with a traveling bed or carriage and furnished with proper devices for clamping and holding the blank thereon; but I do not wish to be understood as limiting my invention to the use of this particular class of feed devices—*i. e.*, such as employ a traveling carriage with the blank fastened thereto—as other known styles of feeding devices may be substituted which will permit of a lateral reciprocating motion being given to the blank during its passage beneath the cutter-head.

As before remarked, the present machine is especially designed for what is known as "panel-work," and to that end is furnished with a carriage E, provided with movable clamping-dogs e or equivalent devices for holding the blank. The carriage E is mounted to move longitudinally in ways e' on a base plate or support E′, the latter supported on guides e^3 on the main frame, so as to have motion in a plane transverse to the motion of the carriage. It will be observed that the longitudinal motion of the carriage E, herein termed the "feed motion," is in a direction substantially at right angles to the arbor carrying the cutter-head, whereas the movement of the support E′ is in a direction substantially parallel to the axis of the arbor and transverse to the feed motion, and, further, that the blank supported upon the carriage will partake of both motions during its passage beneath the cutter-head. Hence the actual motion of the material at any one instant will be a mean between the lateral and feed motions, so that if the oscillatory motion of the cutter-head is properly timed and adjusted to coincide with the actual line of movement of the surface at the point acted upon by the cutters the latter will be properly presented to the moving material and will produce the finished design or molding required. The longitudinal movement or feed motion of the carriage E may be effected through the agency of a gear-wheel F, mounted upon a vertical axis or shaft F′ and engaging the teeth of a rack F^2 on the carriage E. The lateral motions of the material may be effected by an eccentric or pattern cam 2, acting through suitable intermediate transmitting devices upon the support E′. Thus in the illustration given the cam 2 is mounted upon the same shaft D, carrying cam 1, and is arranged to act through a yoke g, bell-crank g', and rod g^2 upon the adjustable section E^2 of support E′, the return movements of the support being effected by a lever g^3, engaging said section E^2 and provided with a weight g^4. The transmitting devices are arranged to act upon the section E^2 rather than directly upon an integral portion of the support E′ in order to provide for the convenient adjustment of the carriage and the blank carried thereby, which result is accomplished by interposing an adjusting or extensible connection (represented by screw g^5) between the support E′ and the movable section E^2, whereby the one may be moved nearer to or farther from the other to locate the work properly with reference to the cutter-head.

With the addition of suitable driving mechanism connecting the shaft D, carrying the pattern-cams, and the shaft F′, carrying the gear F, so that these elements will be driven at the proper relative speeds to produce the given design, the machine as thus far described is completely organized for forming moldings or designs running longitudinally of the plank or blank operated upon; but special provision or modification is necessary to enable panel-work to be performed expeditiously and accurately. Thus by reference to Fig. 4 the machine is competent to form designs running lengthwise of the blank, as rep-

resented at $p\ p$; but in order to finish the panel it is necessary to connect the corresponding ends of the two side lines by lines of molding, as represented at $p'\ p'$.

Before describing the means provided for forming panel designs I will refer, briefly, to the driving mechanism or gearing shown for producing and insuring the proper movements of the actuating devices. The pattern-cam shaft D is furnished with a gear d^{10} in mesh with a gear d^{11} on shaft d^{12}, said last-named gear and shaft being driven by a pinion d^{13} on shaft d^{14}, carrying the driving-pulley d^{15}. The shaft d^{12} is supported in bearings in the frame, and on it is mounted a bevel-gear f, connected by a feather and groove or equivalent means permitting the gear to move longitudinally of the shaft, but compelling their simultaneous rotation. The gear f is supported in a frame f', depending from or secured to the support E', and said gear meshes with a gear f^2 on shaft F', carrying gear-wheel F, through which motion is transmitted to the carriage. The shaft F' is permitted longitudinal movement through its bevel-gear f^2 and can be raised and lowered so as to cause its gear F to be brought into contact with rack F^2 to drive the carriage or to be withdrawn from said rack to interrupt the feed motion. In order that the gear F may be readily withdrawn from or placed in connection with the rack, its shaft F' is provided with collars f^6, between which is interposed a loose collar f^7, pivotally connected to a lever f^8, hung on a link f^9 from frame f'. The lever can be operated by the hand or foot to start or interrupt the feed motion, as desired.

In order to adapt the machine for joining the side moldings and form the panel, in place of mounting the carriage in ways on the support E' its ways e' are formed upon a turret or plate H intermediate the carriage and support, but pivotally connected to the latter, so that the said plate or turret, together with the carriage, can be swung around a vertical axis. In the present instance the pivotal connection between the turret and support is effected by providing the support with an annular flange or hub h on its upper surface and forming a circular bearing in the turret fitting upon said hub.

The pivot is preferably annular in form to accommodate the gear F when withdrawn from the rack, and when other means are employed for interrupting the feed motion a solid pivot can, if desired, be used.

Suitable means are employed for holding the turret down upon the support—such, for example, as flanges or bolts g^7, the latter working in slots concentric with the axis of the turret.

The carriage E is provided with two racks F^2, one on either side, and the shaft F' is arranged to one side of the axis about which the turret moves, so that when the carriage is in position to feed the material longitudinally the gear F will engage one rack, and where the turret is swung upon its axis to reverse the position of the blank and the feed motion the opposite rack will be brought into position to engage gear F.

Suitable devices are employed for locking the turret against motion on its pivot after it has been swung around and brought into position for the feed motion to take place. A device of this kind is illustrated by the removable pin 12 passed through the turret or plate and engaging the support, although other equivalent devices may be used for the purpose.

The mode of operation to be pursued in forming panels and like articles wherein the figure is composed of two or more waved or irregular lines of molding intersecting at an angle and formed, the one as a continuation of the other, is as follows: The various actuating devices controlling the feed motion and lateral reciprocations of the carriage and the oscillations of the cutter-head having been properly set or adjusted to produce the required design, the turret is fastened to the support, the carriage is drawn to one extreme of the feed movement—*i. e.*, to the beginning of one of the side lines p, Fig. 4—and the feeding mechanism is started by raising the gear F until its teeth mesh with those of the rack on the carriage. What is termed a "straight-way feed" now takes place—that is to say, the carriage is propelled in a straight line and at the same time reciprocated laterally to correspond to the oscillations of the cutter-head, resulting in the production of a molding running longitudinally of the blank, as represented at p, Fig. 4. As soon as the cutter arrives at the end of line p the actuating mechanisms are disconnected from the driving-shaft, as by means of a clutch or belt-shifter, thereby interrupting the reciprocating motion of the carriage and the oscillating motion of the cutter-head, after which the gear F is withdrawn to release the carriage. When the end of the panel is to be provided with a symmetrical curve joining the two side moldings p, the axial center of the turret is brought in line with the arbor of the cutter-head, but to one side of the axis about which the cutter-head oscillates, and the cutter-head is brought to a center—that is, midway of the oscillations—so that the arbor will stand on a line radial to the center of the turret. This adjustment to center the arbor may readily be obtained should the machine not be stopped at the exact point, by a proper manipulation of the actuating devices, for which purpose a hand-wheel J may be provided to assist in turning the gear-train so as to properly locate the cutter-head. The pin or other fastening device for locking the turret upon its support is now withdrawn and the turret, carriage, and blank are swung around, thus causing the cutter to traverse the blank in the arc of a circle. This motion is continued until the hole or other indicator on the opposite side

of the turret registers with the hole in the support and the pin is again inserted and the turret locked to its support.

Owing to the fact that the shaft of gear F is located to one side of the center about which the turret was turned as the carriage is reversed—that is, changed end for end upon its support—the opposite rack is brought into position to be engaged by said gear F, so that upon elevating the gear the feed motion will again take place, but in the opposite direction from the first feed.

It is of course understood that the driving-gear and actuating devices are set in motion simultaneously with the inauguration of the feed movement, which action is insured by raising the gear F into engagement with the rack before starting up the gear-train.

The remaining side and end are completed by repeating the operations described in forming the first side and end, the cutter being brought back to the starting-point without having been once taken from the cut.

An infinite variety of designs or moldings can be produced by the proper adjustment of the several mechanisms and complete and perfect paneling can be made without joint or break; or, if desired, the panel can be made up of a number of separate strips, blocks, or parts fitted together and subjected to the action of the machine, either separately, in groups, or collectively, and in any event the moldings can be made to match perfectly without subsequent fitting.

The movable carriage and its pivoted support or turret may be employed to advantage in connection with an oscillatory reciprocating cutting mechanism—such as is shown in the Goehring patents referred to—for forming panels, in which case the devices for reciprocating the support on which the turret is mounted may be disconnected or dispensed with.

It will be observed that in this machine a fixed center is provided about which the work-holder and the guides in which it travels is turned. Hence the cutter-head will always bear a fixed relation to the work at the point of contact therewith, the mandrel preserving the same radial position. This is effected by arranging the flange or hub *h*, upon which the carriage and its ways are turned within its axis, coincident with the axis of the shaft supporting the cutter-head arbor, so that when the feed-motion is arrested and the turret reversed or turned half-way around, the arbor of the cutter-head will stand on a line substantially radial to the axis of motion.

Having thus described my invention, what I claim as new is—

1. In a molding-machine, the combination, with an oscillating cutter-head, of a feeding mechanism for advancing the material beneath the cutter-head and a work-support reciprocated laterally of the line of feed motion, substantially as described.

2. In a molding-machine, the combination, with the oscillating cutter-head, of a longitudinally-movable and laterally-reciprocating work-support, substantially as described.

3. In a molding-machine, wherein the material is fed at predetermined speed past a rotating cutter-head oscillating about an axis perpendicular to the direction of the feed motion of the material, and in combination with the feeding devices and oscillating cutter-head thereof, a support for the material, and actuating devices engaging said support and operating to reciprocate the material on a line transverse to the direction of feed motion and in direction and degree proportional to the oscillations of the cutter-head, substantially as described.

4. In a molding-machine, the combination, with the rotating cutter-head mounted to oscillate about an axis perpendicular to the axis of rotation, of a longitudinally-movable and laterally-reciprocating work-support or carriage, substantially as described.

5. In a molding-machine, the combination, with an oscillating cutter-head and a carriage movable in a plane substantially perpendicular to the axis about which the cutter-head oscillates, said carriage being connected to a movable frame or support reciprocating in a direction transverse to the feed motion, substantially as described.

6. In a molding-machine, and in combination with the oscillating cutter-head thereof, a movable carriage supported in reversible guides, substantially as described.

7. In a molding-machine, and in combination with the rotating cutter-head thereof, a traveling carriage or work-support movable in guides on a reversible plate or turret, substantially as described.

8. In a molding-machine, and in combination with the cutter-head thereof, a reciprocating support or frame carrying a reversible plate or turret and a work-support or carriage mounted in guides on said reversible plate or turret, substantially as described.

9. In a molding-machine, and in combination with the oscillating cutter-head thereof, a reciprocating frame or support, a plate or turret pivotally mounted upon said reciprocating support, a work-support or carriage mounted upon said turret, and actuating devices for reciprocating said support and feeding devices for advancing the carriage, substantially as described.

10. In a machine, the combination, with a feeding mechanism, a work-support reciprocating laterally of the direction of feed, and a rotating cutter-head mounted to oscillate about an axis intersecting the cutters and the material, substantially as described.

11. In a machine, the combination, with a frame or support movable in guides on the main frame, a plate or turret pivotally attached to said support and provided with means for locking it in position, and a work-support or carriage movable in guides on said rotary turret, substantially as described.

12. In a machine, the combination, with the supporting-frame and the plate or turret pivotally mounted thereon, the work-support or carriage movable on the turret and provided with two racks, and the driving-gear mounted upon a shaft set eccentrically to the axis of the turret, substantially as described.

13. In a machine, and in combination with the work-support or carriage movable in guides on the reversible turret or plate and provided with two racks, the support or frame to which said turret is attached and the movable driving-gear set eccentrically to the axis of the turret, substantially as described.

14. In a machine, and in combination with the oscillating cutter-head, a work-support or carriage movable in guides and supported upon a plate or turret, the latter pivotally supported to move about an axis parallel with but to one side of the axis about which the cutter-head oscillates, substantially as described.

15. In a machine, and in combination with the oscillating cutter-head, a plate or turret movable about an axis parallel with the axis about which the cutter-head oscillates, a support for said turret movable in guides, and a work-support or carriage mounted on the turret and movable in a plane transverse to the direction of motion of the supporting-frame on which the turret is mounted, substantially as described.

16. In a machine, the combination, with a reversible work-support or carriage provided with two racks, of a driving-gear rotating in one direction and adapted to alternately engage the racks for reversing the motion of the carriage, substantially as described.

17. In a machine, and in combination with the carriage, its pivoted supporting plate or turret, and the movable frame or support therefor, the feed-operating devices mounted upon said movable frame and actuating the carriage, the same comprising the longitudinally-movable shaft carrying the gear for engaging the carriage, the gears for transmitting motion from the driving-shaft to the said movable shaft, and the devices for reciprocating said last-named shaft to start or stop the carriage, substantially as described.

18. In a machine, and in combination with the oscillating cutter-head, laterally-reciprocating work-support, and feeding devices for advancing the material, a gear-train and actuating devices controlling the oscillation of the cutter-head, the feed motion, and the lateral reciprocations of the material, substantially as described.

19. In a machine, and in combination with the oscillating cutter-head and longitudinally-movable carriage or work-support, the frame or support reciprocating laterally of the feed motion, and a reversible plate or turret interposed between the said carriage and reciprocating frame, actuating devices for reciprocating said frame, and actuating devices for feeding the carriage, provided with means for interrupting the feed, substantially as described.

20. In a machine, and in combination with the longitudinally-movable work-support or carriage, the laterally-reciprocating support or frame on which said carriage is mounted, actuating devices for reciprocating said frame, and an extensible connection interposed in the line of said actuating devices and operating to adjust the position of the carriage and its line of motion with respect to the axis about which the cutter-head oscillates, substantially as described.

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