Aug. 20, 1935. I. B. WHINERY 2,012,059

CARVING MACHINE

Filed Jan. 11, 1932 2 Sheets-Sheet 1

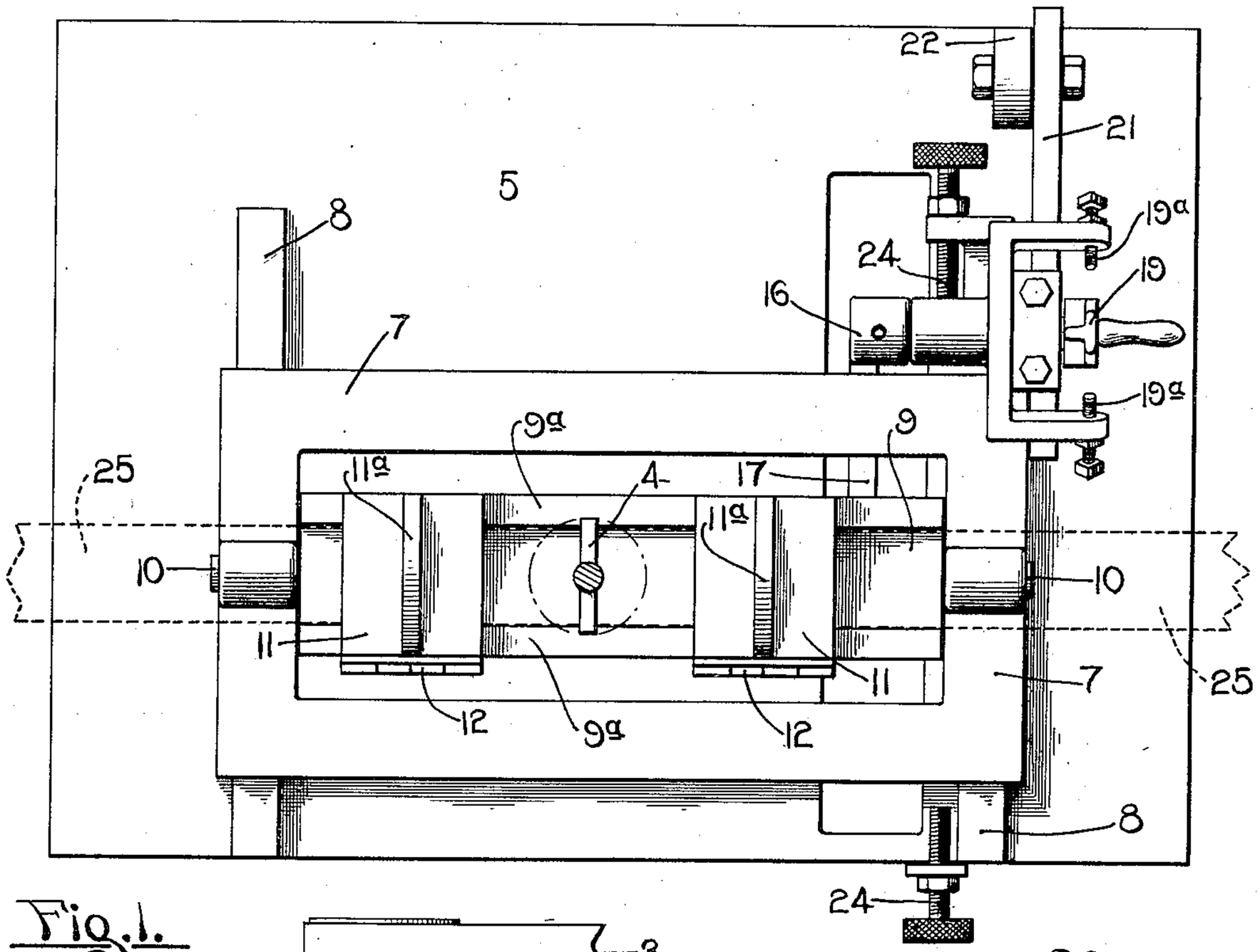


Fig. 1.

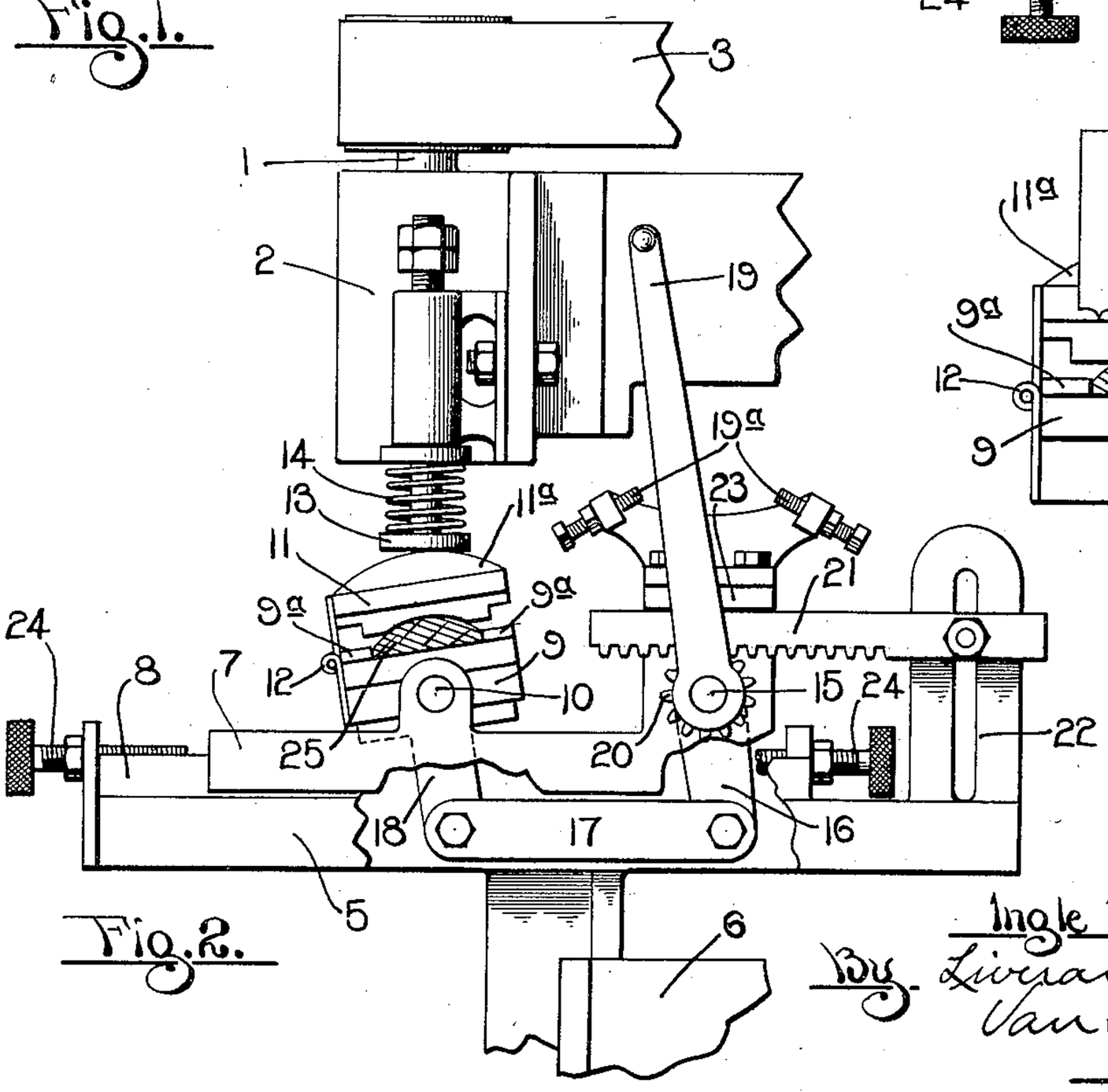


Fig. 2.

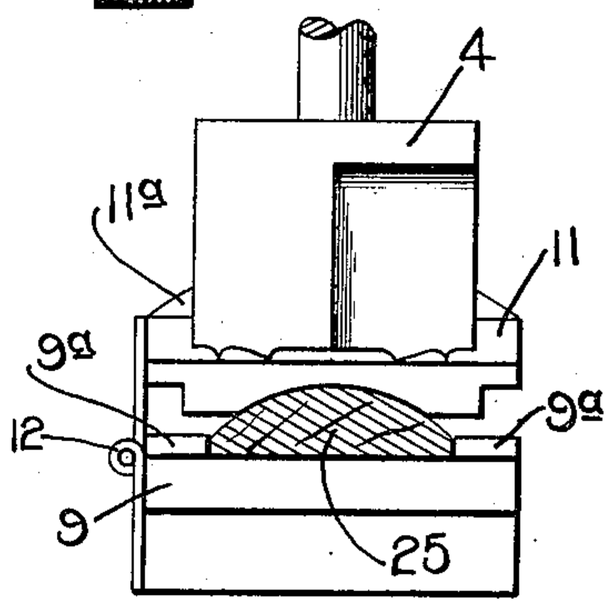


Fig. 3.

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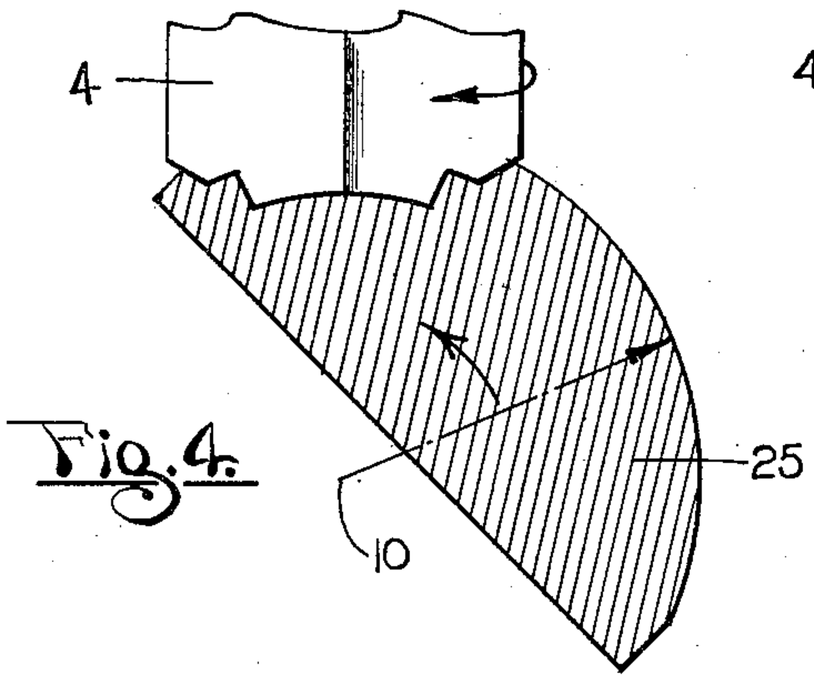



Fig. 4.

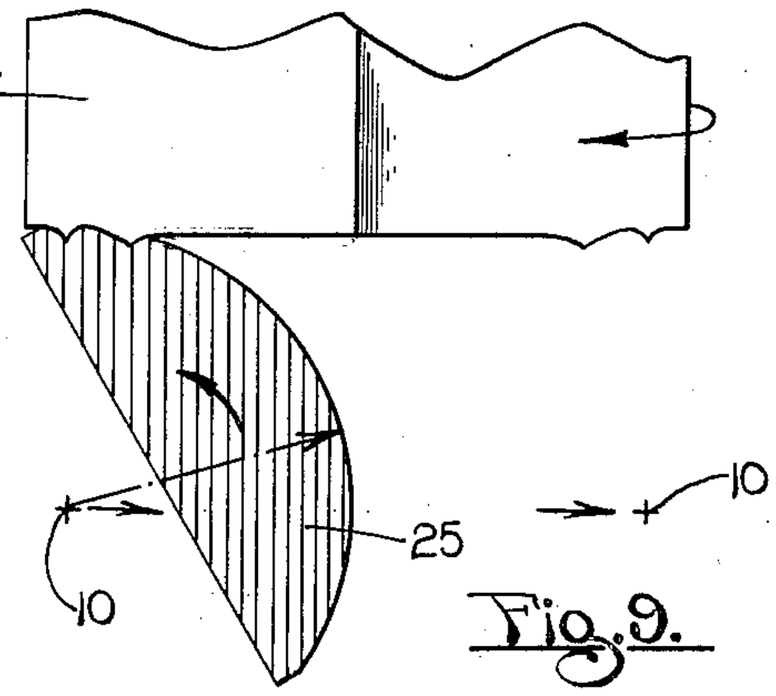



Fig. 9.

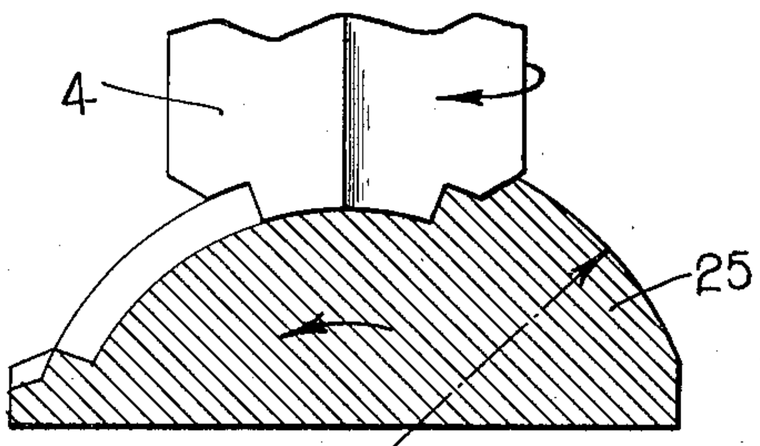



Fig. 5.

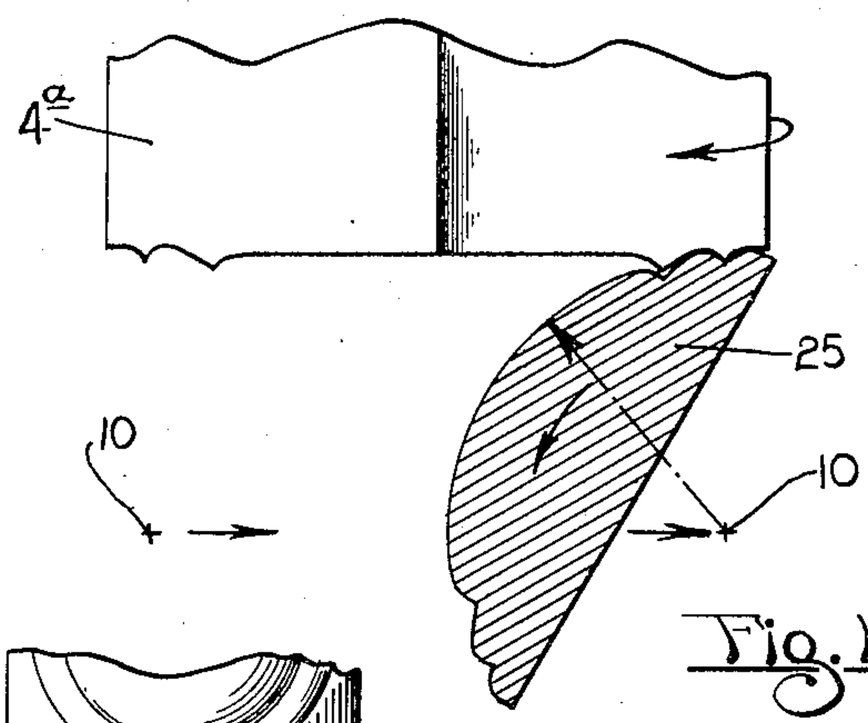



Fig. 10.

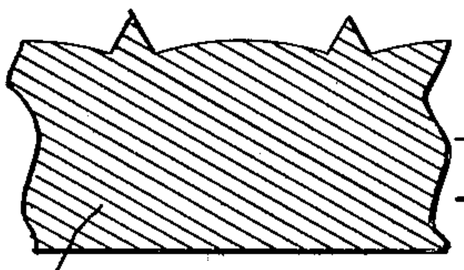


Fig. 6.

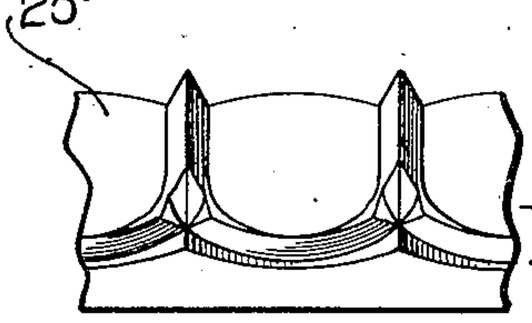
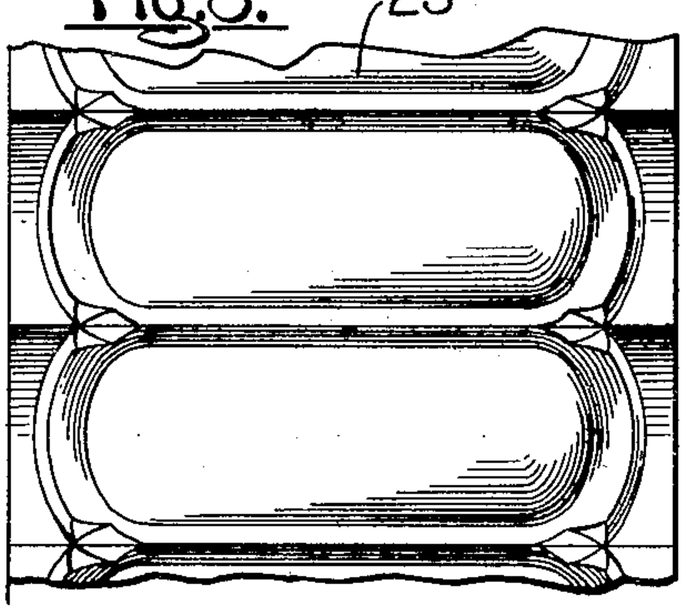



Fig. 7.

Fig. 8.



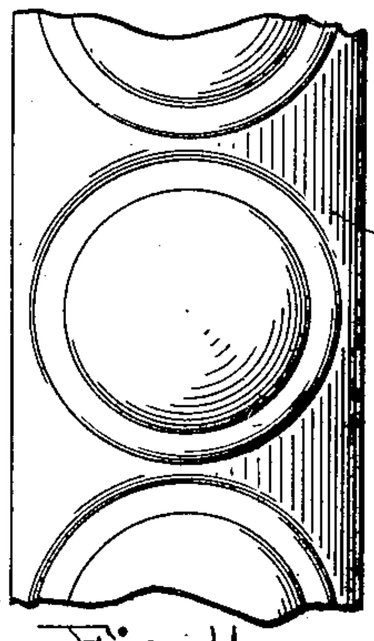




Fig. 11.

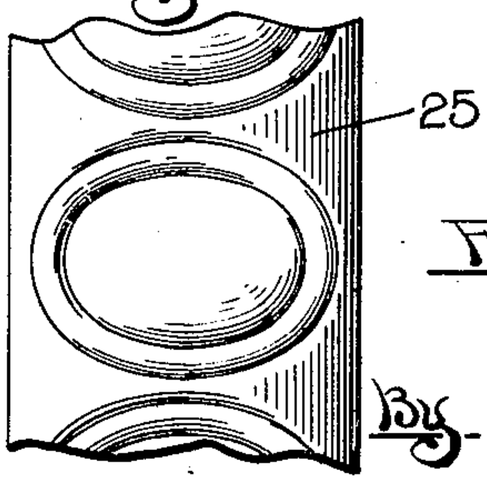



Fig. 12.

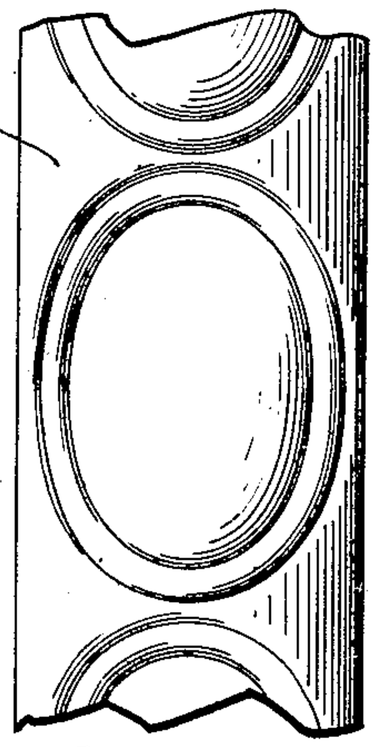



Fig. 13.

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Patented Aug. 20, 1935 2,012,059

# UNITED STATES PATENT OFFICE

2,012,059

## CARVING MACHINE

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Application January 11, 1932, Serial No. 585,825

18 Claims. (Cl. 144—137)

This invention relates to carving machines and more particularly to that class of machines adapted by means of a rotating cutter to cut designs into the surface of wood or other material.

The machine is particularly intended to carve designs into long narrow strips of wood commonly called moldings in which the designs are repeated side by side throughout the length of the piece and the particular object of this invention is to provide a machine of this nature which will utilize a rotating cutter having its cutting edge extending transversely to its axis of rotation, commonly known as a rosette cutter, and which will cut designs into an arc-shaped surface of the work, said designs being correspondingly arc-shaped to follow the surface.

In the prior art machines of an analogous nature have been used in which a rotating tool or rosette cutter would work upon and cut designs into work having a flat surface. With such machines it is well known that a great variety of designs may be cut by varying the shape of the cutting tool and by overlapping the designs in different ways. With the present machine the same means for getting a variety of designs are utilized and in addition entirely different designs and an added variety may be produced by cutting the designs on a curved or arc-shaped surface.

The invention provides various new and useful features of construction and arrangement as hereinafter more fully described and particularly pointed out in the claims, reference being had to the accompanying drawings, in which

Fig. 1 is a plan view of the bed and work holding portions of a machine embodying this invention.

Fig. 2 is an end elevation of the essential parts of the machine with portions broken away.

Fig. 3 is an enlarged fragmentary elevation showing the cutter and the work clamp with a section of molding therein.

Fig. 4 is a diagram illustrating a cross section of molding and a portion of the cutter in position at the beginning of cutting a pattern in the so-called rotating movement.

Fig. 5 shows the same with the design partially completed.

Fig. 6 is a fragmentary longitudinal section of the molding with the design cut according to the method illustrated in Figs. 4 and 5.

Figs. 7 and 8 are a side elevation and a plan view respectively, of a portion of a molding cut as shown in Figs. 4 and 5.

Fig. 9 shows a cross section of molding and a portion of the cutter at the beginning of the operation of cutting a design using the so-called rolling movement.

Fig. 10 shows the same parts at the completion of the operation.

Figs. 11, 12 and 13 are plan views of fragments of molding cut according to the operation illustrated in Figs. 9 and 10 showing variations in shapes of the designs produced by adjustment of certain parts of the mechanism.

Like reference numbers refer to like parts in all the figures.

The machine of the type which is preferably utilized to embody this invention is that commonly known as a routing machine having a vertical spindle 1 mounted in an arm 2 and being driven by a belt 3, said spindle having at its lower end a conventional chuck in which a routing tool or cutter 4 may be attached. The cutting tool is of the type which has its cutting edge at its end or extending transversely to its axis of rotation as distinguished from a type of cutter having its cutting edge on its periphery.

The machine also has a bed or table 5 mounted for vertical movement on a fixed portion 6 of the frame of the machine. There is also provided suitable and conventional means (not shown) for reciprocating the table 5 vertically. Only fragments of the conventional parts of the machine are illustrated herein since any machine of this character having a rotating spindle and a work holding table movable in a direction parallel to the axis of the spindle may be utilized to embody the present invention and such types of machines are well known to those skilled in the art.

Upon the table 5 is mounted a cross slide 7 guided by tracks 8 and movable in a plane at right angles to the axis of the spindle 1. A work holding clamp is mounted upon the slide 7, said clamp comprising a lower member 9 supported by trunnions 10 at its respective ends on the slide 7 so that it may be rocked upon the slide. The lower clamping member 9 is preferably provided on its upper surface with guides 9a extending longitudinally thereof and spaced apart a proper distance to permit the work to fit lengthwise between them so that it will be properly located but may be permitted to slide longitudinally.

Upper clamping members 11 are hinged by hinges 12 to the lower clamping member 9 and have lower curved surfaces shaped to fit the curved surface of the work. The upper clamping members 11 are spaced apart and located at re-

spective sides of the spindle 1 so that the cutter 4 may operate between them. The upper sides of the members 11 are provided with curved surfaces 11*a* which are engaged by spring actuated plungers 13, which plungers are mounted on the arm 2 which carries the spindle 1 and are yieldably thrust downward by springs 14.

A short shaft 15 is rotatably mounted in the slide near the rear end at one end thereof and is provided with a downwardly extending arm 16 which is connected by a link 17 with a corresponding downwardly extending arm 18 attached to the underside of the lower clamp member 9. The shaft 15 is also provided with a manually operable lever 19 and a gear 20, which gear meshes with a rack 21, the rack being attached at its rear end to a bracket 22 fixed to and extending upwardly from the table 5. A guide block 23, mounted on the slide above the shaft 15, overhangs the upper edge of the rack 21 and holds it into engagement with the gear 20. For reasons hereafter described the gear 20 is interchangeable with other gears of other diameters and for that purpose the guide block 23 may be replaced with similar blocks of different dimensions to properly hold the chosen gear in mesh with the rack and the end of the rack attached to the bracket 22 is vertically adjustable so that it may be properly alined with the gear in use.

Stop screws 24 are mounted on some part of the structure which does not slide horizontally such as the table 5 or one of the tracks 8 in a position to be engaged by the slide 7 to limit its sliding movement in either direction and these screws may be adjusted so that the extent of the sliding movement may be varied or if desired for certain operations hereafter described both screws may be adjusted to simultaneously engage opposite edges of the slide so that it will be held immovable. Stop screws 19*a* are also provided on a fixed portion of the slide 7 and located to engage opposite sides of the lever 19 to limit its oscillating movement in each direction.

*Operation*

It will be seen that the mechanism described provides a machine in which there is a spindle rotatable upon a vertical axis and having a cutter of the rosette cutter type and below which there is a table movable toward and away from the cutter in a direction parallel with its axis. Upon the table the work holding clamp provides means for holding a strip of molding which preferably has previously been provided with an upper curved surface and this molding is held in position to be engaged by the cutter when the table is moved upwardly.

Assuming that the work hereafter termed molding and generally designated as 25 is in place in the lower clamp member 9 between the guides 9*a* and that the table 5 is in lowered position, then in this lowered position the upper clamping members rest lightly upon the upper surface of the molding and the molding may be moved longitudinally in the clamp. In this lowered position it is to be understood that the plungers 13 do not engage the upper surface 11*a* of the clamp members 11.

The table may then be elevated by suitable means provided for that purpose and during the first part of such elevation the plungers 13 engage the clamp members 11 and press them firmly against the molding so that it is held tightly in position and further upward movement brings the molding into engagement with the rotating cutter 4. While the parts are held in this elevated position with the cutter operating its full desired depth in the molding and with the parts arranged as shown in Fig. 2 the lever 19 is manually oscillated which rocks the work clamp and molding therein on the trunnions 10 by virtue of the arms 16 and 18 connected by the links 17 and at the same time moves the slide 7 on the tracks 8, this sliding movement being caused by action of the gear 20 travelling on the rack 21. These movements produce what may be termed a rolling movement of the molding relative to the cutter 4.

A rocking movement of the molding relative to the cutter may be accomplished by removing either or both the rack 21 and the gear 20 and by adjusting the stop screws 24 so that they will both engage opposite sides of the slides 7 to hold the slide immovable in which case oscillation of the lever 19 will merely cause rocking of the clamp and work on the trunnions 10 without the accompanying sliding movement.

Referring to Figs. 4, 5, 6, 7 and 8, which illustrate the operation accomplished by the rocking movement and the work accomplished thereby, Fig. 4 shows the molding 25 in a position where the cutter 4 is operating to cut a design with the molding turned to its extreme position in one direction. The center point 10 indicates the axis of rocking which is co-incident with the axes of the trunnions 10 and by movement of the lever 19 the molding is caused to rock while the cutter 4 continues to operate upon it causing the cutter to follow the arc-shaped surface of the molding which arc is concentric with the axis 10.

The rocking movement of the molding may be continued throughout its entire curved surface or may be stopped wherever desired producing a design elongated crosswise of the molding, said design having curved ends and elongated intermediary portions. The extent of movement of the work is limited by engagement of the lever 19 with the stop screws 19*a* which may be adjusted as desired. In the design shown a slight overlapping of the figures occurs, that is, the cutter in producing one design overlaps longitudinally of the molding the next design which produces the effect shown. Greater or less spacing of the designs longitudinally of the molding would produce different effects performed by the same cutter.

Operation of the device to cut a design by the so-called rolling process and designs so cut are illustrated in Figs. 9, 10, 11, 12 and 13. To produce this operation and result the machine is arranged as shown in Fig. 2 with the gear 20 and rack 21 in place and the stop screws 24 adjusted to permit movement of the slide 7. With the parts so arranged and assuming that the work is in engagement with the cutter and the lever 19 moved to one extreme position the molding will assume the position shown in Fig. 9 and as the lever 19 is moved to its opposite position the molding will be caused to rotate about the axis 10 caused by movement of the arms 16 and 18 and the link 17 and at the same time the axis 10 will be moved transversely of the molding causing the arc surface of the molding to assume a rolling motion relative to the cutter.

If it is desired by this rolling operation to cut a circular design, or in other words, a design which would, if developed on a plain surface be circular, the cutter designated at 4*a* in Figs. 9 and 10 should be of sufficient diameter so that its cut-

ting edge will be of a length equal to the length of the arc of the design. With a gear of proper diameter to advance the axis 10 at the same speed as rocking of the periphery of the molding, or in other words a gear having a pitch diameter equal to the radius of the curved surface of the molding, a truly circular design cut into the curved surface may be produced as shown in Fig. 11. However, by varying the diameters of the gear 20 relative to the radius of the molding so that the axis 10 will be advanced either slower or faster than the rocking of the periphery of the molding, ellipses having their greatest diameters extending either transversely or longitudinally of the molding may be cut as illustrated in Figs. 12 and 13. In performing the rolling operation either the stop screws 19*a* or 24 may be used to limit the movements in both directions.

It will be understood that, although both the rocking and the rolling operations have been described as beginning at one side of the molding and rotating the molding to bring the tool to its other side, the operation may be started and finished at any point during the rolling or rocking movement, it being necessary only to move the lever 19 and to move the work in contact with the tool throughout its entire movement and the operation may be begun in the middle of the design and completed by moving the work both ways respectively therefrom as well as in any other way.

It will also be understood that after completion of cutting a single design the table 5 is lowered which automatically releases the upper clamp members 11*a* from the plungers 13 and permits the molding to be moved lengthwise to a proper position where repeated elevation of the table will cut another design and this operation is repeated throughout the entire length of the molding.

The machine has been shown and described as with the spindle 1 mounted in the first arm 2 and the table 5 movable toward or away from the spindle and cutter 4. An identical result may be obtained in reversing the movable parts wherein the table 5 with the aforedescribed parts mounted thereon is fixed and the rotating spindle 1 and knife 4 mounted to move toward or away from the work.

In the claims the term rosette cutter is to be defined as meaning that type of cutter having its cutting edge extending substantially transversely of the axis of rotation of the cutter.

The invention has been herein shown and described in its preferred form in which the work is rocked or rocked and moved laterally on an axis extending substantially at right angles to the axis of a rosette cutter but the invention is conceived in various modifications in which other types of cutters may be used and wherein various results are obtained by rocking the work on axes located differently than perpendicularly to the axis of the cutter and more particularly where the rocking movement of the work is accompanied by a lateral movement of the axis. The various modifications are not specifically shown nor described but the invention as defined in the appended claims is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. A carving machine comprising, a rosette cutter having an axis of rotation, means for holding work in operative engagement with said rosette cutter, means for simultaneously rocking said work holding means on an axis substantially at right angles to the axis of the rosette cutter and for moving the axis of rocking of the work holding means in a direction transverse to the axis of the rosette cutter and laterally of the axis of the work, and means for altering the ratio between said rocking movement of the work holding means and lateral movement of the axis thereof.

2. The elements in combination defined in claim 1, in which said work holding means is arranged to hold an elongated piece of work, means for clamping said work on said work holding means in the direction of its length and the axis of rotation of said work holding means extending substantially parallel with the length of said work.

3. A carving machine comprising, a rosette cutter having an axis of rotation, means for holding elongated work and for moving said work into operative engagement with said rosette cutter, means for partially rotating said work on an axis extending longitudinally thereof, said axis extending substantially at right angles to the axis of the rosette cutter and automatic means for clamping the work against longitudinal movement in the work holding means while the work is in engagement with the rosette cutter and for unclamping the work to permit longitudinal movement in the work holding means when the work is out of engagement with the rosette cutter.

4. The elements in combination defined by claim 3 combined with means for moving the axis of partial rotation of the work in a direction transverse to the axis of the rosette cutter and laterally of the axis of the work acting simultaneously with partial rotation of the work.

5. A carving machine comprising, a rosette cutter having an axis of rotation, a slide movable in a plane substantially at right angles to the axis of the rosette cutter, a work holder adapted to receive an article to be operated upon by the rosette cutter, said work holder being mounted on said slide for oscillation on an axis extending transversely of the movement of the slide and in in a plane substantially at right angles to the axis of the rosette cutter, and means for moving said slide and work holder toward said rosette cutter.

6. The elements in combination defined by claim 5 combined with means for causing simultaneous movement of said work holder and movement of said slide.

7. The elements in combination defined by claim 5 combined with means for causing simultaneous movement of the work holder and movement of the slide and means for altering the ratio of the movement of the work holder relative to the movement of the slide.

8. The elements in combination defined by claim 5 combined with means for clamping the work upon said work holder, said clamping means being operative when the work is engaged by the rosette cutter and inoperative in the opposite position.

9. A carving machine comprising, a rosette cutter having an axis of rotation, a table movable in a direction parallel to the axis of the rosette cutter, a slide movable on said table in a direction substantially at right angles to the axis of the rosette cutter, a work holder mounted on said slide for oscillation on an axis transverse to the movement of the slide and substantially at right angles to the axis of the rosette cutter, a shaft journaled on said slide, means associated with said shaft and said work holder to cause simul-

taneous oscillation of each, and means associated with said shaft and said table to cause movement of the slide by oscillation of said shaft.

10. The elements in combination defined by claim 9 combined with means for altering the ratio of the movement of the slide relative to the oscillation of the work holder.

11. The elements in combination defined by claim 9 combined with means for holding said slide stationary and for causing the said slide operating means actuated by said shaft to become inoperative whereby oscillation of said shaft will cause only oscillation of said work holder.

12. A carving machine comprising, a rosette cutter having an axis of rotation, the rosette cutter having a projection spaced from its axis, a work holder for holding work in operative engagement with said rosette cutter, automatic means for clamping an elongated piece of work on said work holder when the work is contacted by the rosette cutter and for unclamping the work at other times and means for rotating said work holder on an axis extending laterally of the axis of the rosette cutter and substantially parallel with the length of the work.

13. A carving machine of the class described comprising, a rosette cutter having an axis of rotation, means for holding work in operative engagement with the end surface of the cutter and means for simultaneously rocking said work holding means on an axis substantially at right angles to the axis of the cutter and for moving the axis of rocking of the work holding means in a direction transverse to the axis of the cutter and laterally of the axis of the work.

14. The elements in combination defined in claim 13, combined with means for limiting the rocking movement of the work holding means to a definite predetermined arc.

15. The elements in combination defined in claim 13, combined with adjustable means for limiting the rocking movement of the work holding means to a predetermincd arc and for adjusting the length of said arc.

16. The elements in combination defined in claim 13, in which the length of the cutting surface of the rosette cutter is equal to the length of the arc of the figure carved.

17. A carving machine comprising, a rosette cutter having an axis of rotation, means for holding elongated work and for moving said work into operative engagement with said rosette cutter, means for partially rotating said work on an axis extending longitudinally thereof, said axis extending substantially at right angles to the axis of the rosette cutter, automatic means for clamping the work against longitudinal movement in the work holding means while the work is in engagement with the rosette cutter and for unclamping the work to permit longitudinal movement in the work holding means when the work is out of engagement with the rosette cutter, and means for limiting the rotating movement of the work to a definite predetermined arc.

18. A carving machine comprising, a rosette cutter having an axis of rotation, means for holding elongated work and for moving said work into operative engagement with said rosette cutter, means for partially rotating said work on an axis extending longitudinally thereof, said axis extending substantially at right angles to the axis of the rosette cutter, automatic means for clamping the work against longitudinal movement in the work holding means while the work is in engagement with the rosette cutter and for unclamping the work to permit longitudinal movement in the work holding means when the work is out of engagement with the rosette cutter, and adjustable means for limiting the rotating movement of the work to a predetermined arc and for adjusting the length of said arc.

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