No. 639,542. Patented Dec. 19, 1899.

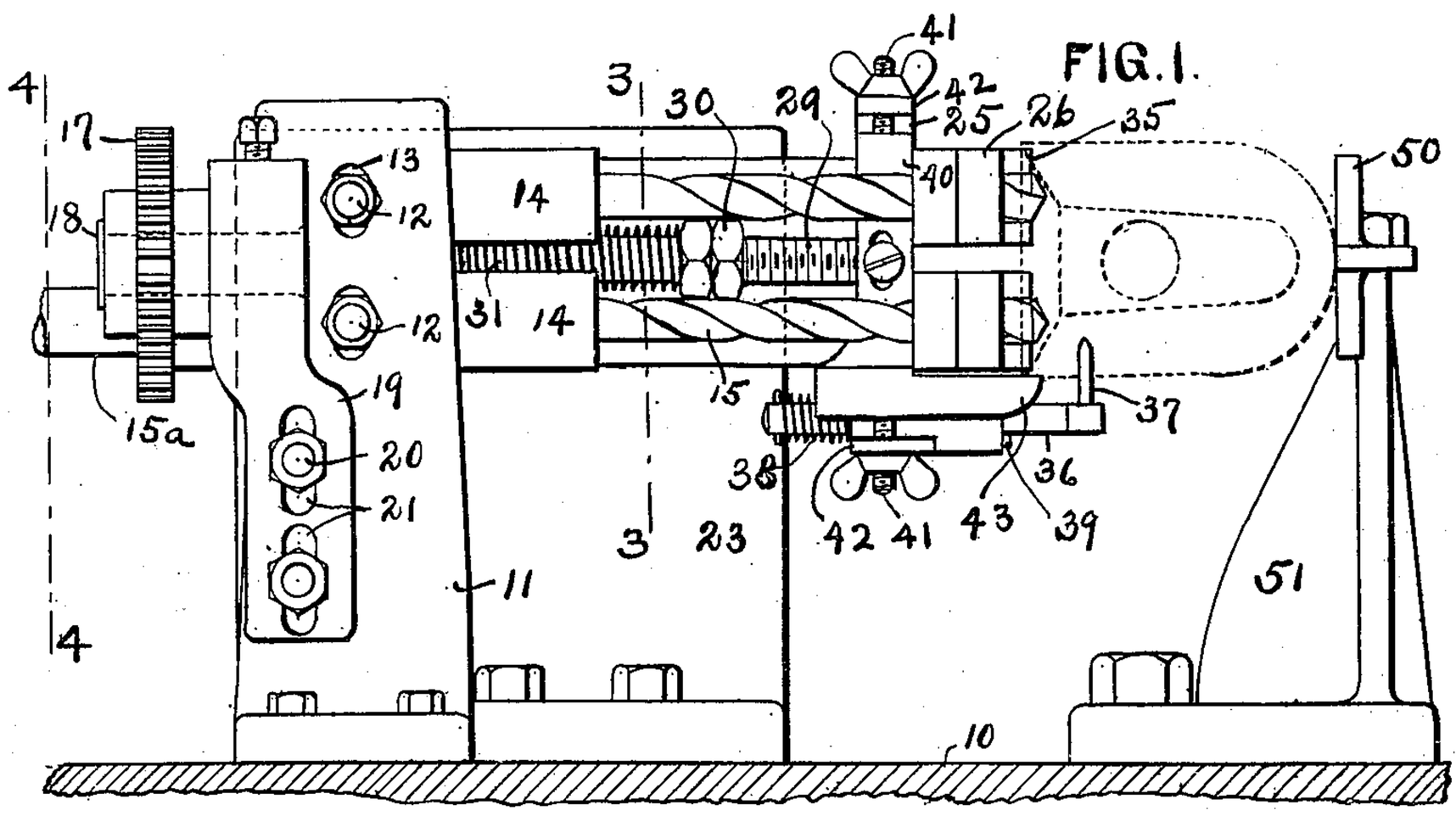
# E. A. EASTMAN.

## MACHINE FOR HINGING LASTS.

(Application filed Mar. 14, 1898.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.



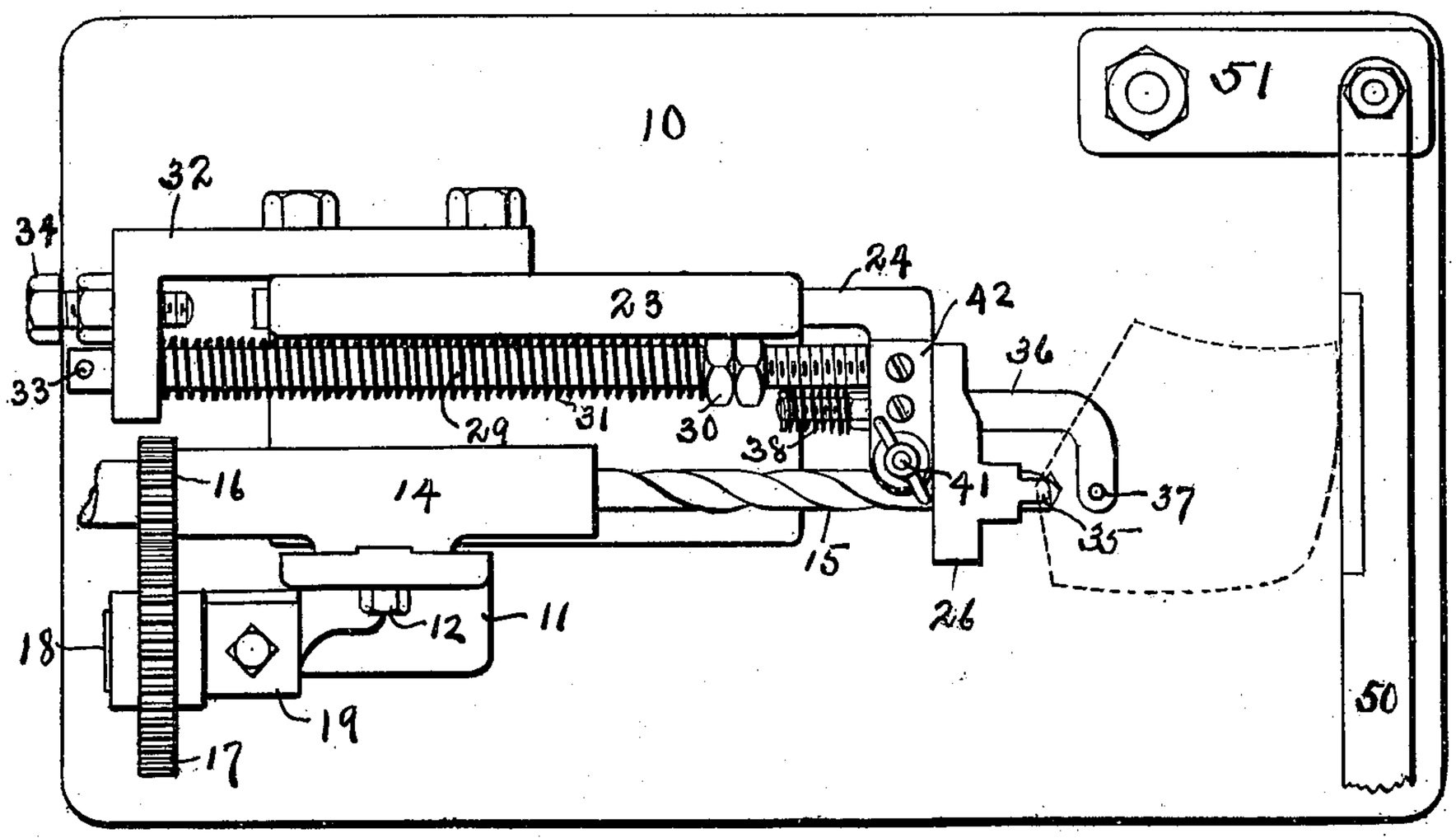




FIG. 2.

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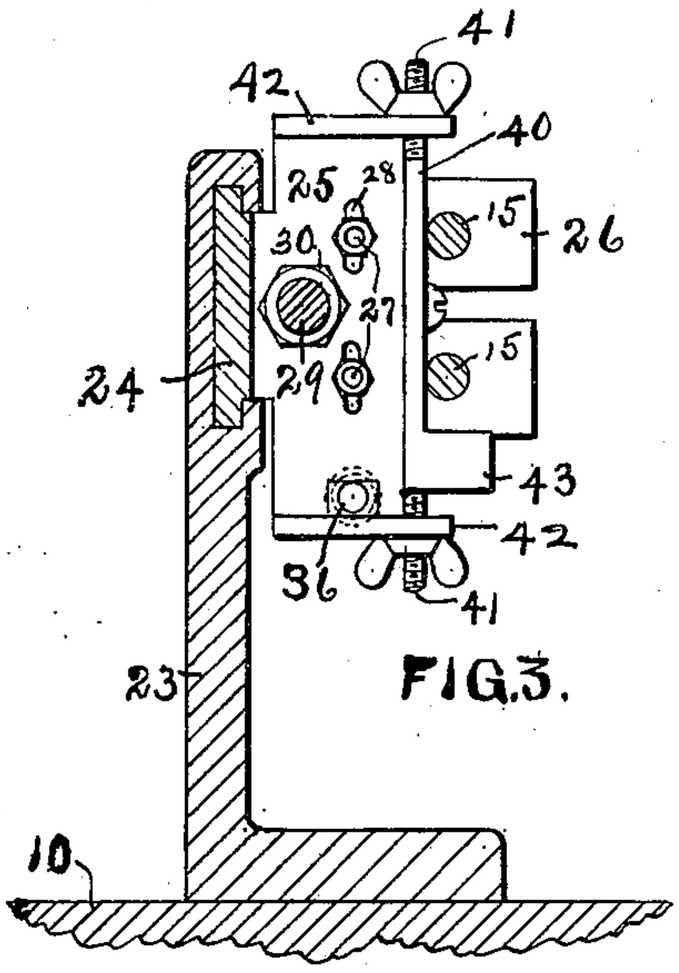



FIG. 3.

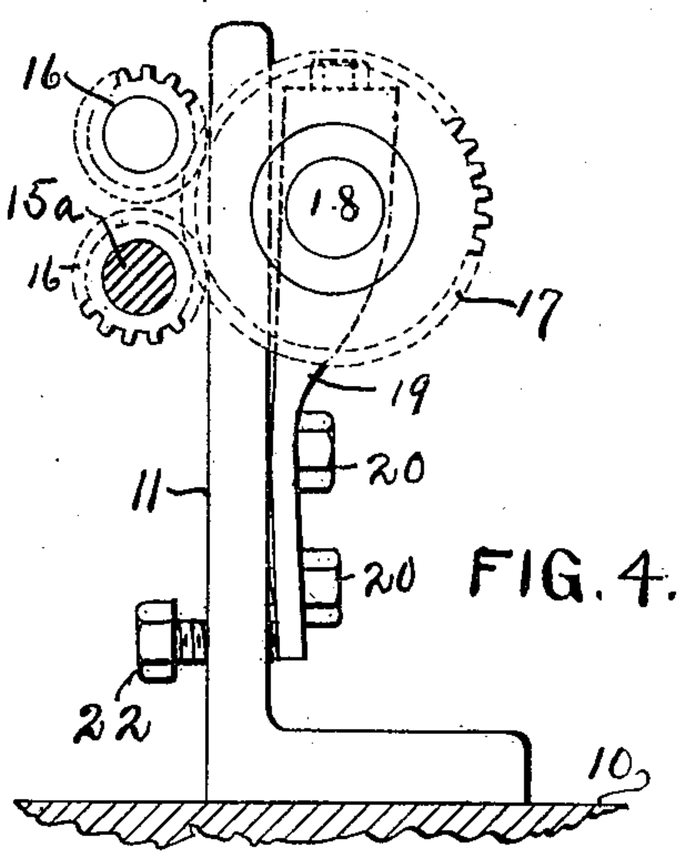



FIG. 4.

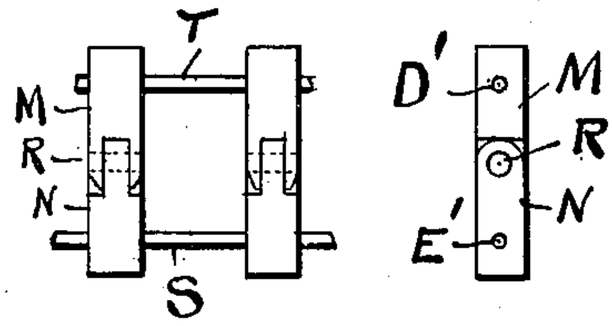



FIG. 7.

FIG. 5.

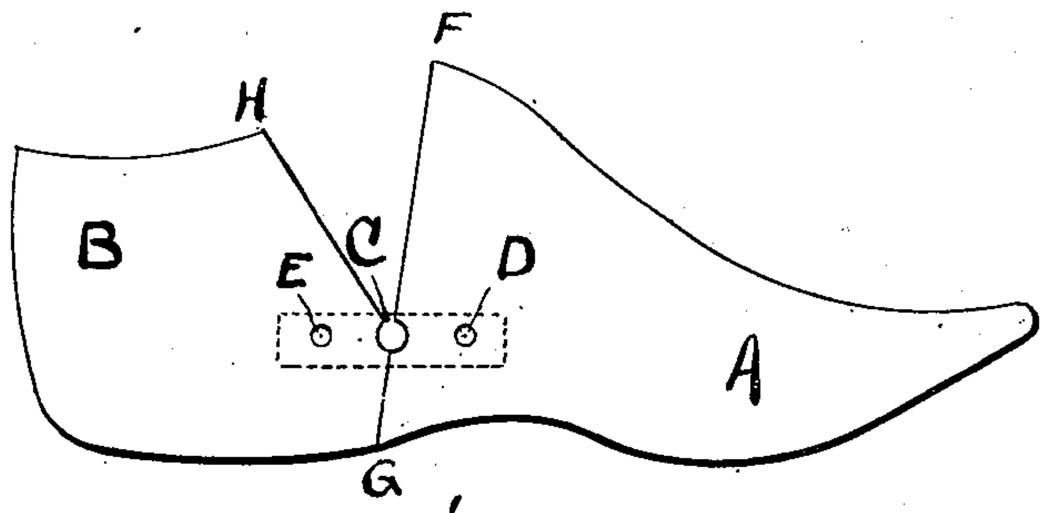
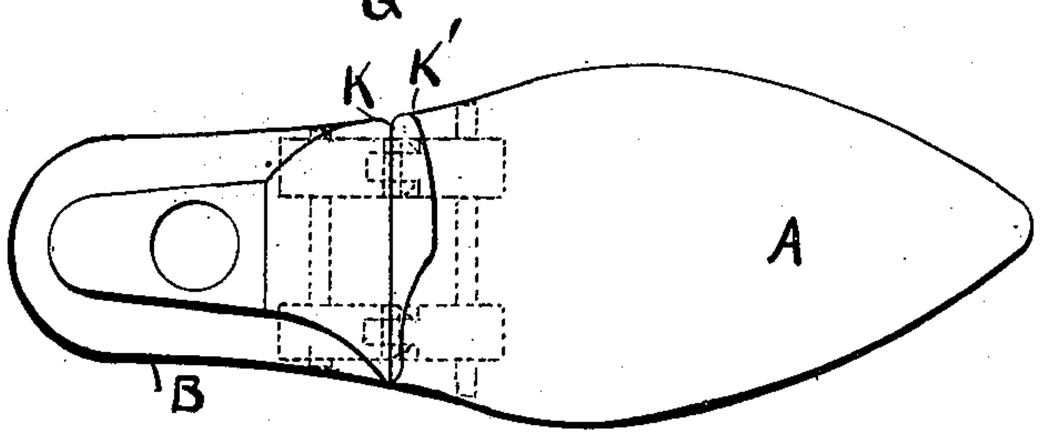



FIG. 6.

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# UNITED STATES PATENT OFFICE.

ERNEST A. EASTMAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE CHICAGO LAST AND DIE COMPANY, OF SAME PLACE.

## MACHINE FOR HINGING LASTS.

SPECIFICATION forming part of Letters Patent No. 639,542, dated December 19, 1899.

Application filed March 14, 1898. Serial No. 673,795. (No model.)

*To all whom it may concern:*

Be it known that I, ERNEST A. EASTMAN, 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 Machines for Hinging Lasts or Similar Sections, of which the following is a specification.

My invention relates to lasts having the front and rear portions connected together by a hinged joint, and has for its object the provision of means for securing the accurate location of a pair of hinges inserted in the wood of the last at positions removed from the exterior of the completed last. The ultimate object to be obtained is a last having its hinge so made that there will be no tendency to split the wood. The best form of last with which I am at present familiar is one constructed in accordance with the pending application of Fillmore Decker for a hinged last, filed October 4, 1897, Serial No. 654,006; and this invention is designed to produce a machine by which I may carry out my method of constructing this last as expeditiously and accurately as possible.

In the accompanying drawings, Figure 1 is a front elevation of my machine. Fig. 2 is a plan. 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, showing the tool-driving mechanism. Figs. 5 and 6 are a side elevation and a plan view, respectively, of the last; and Fig. 7 is a detail of the hinge.

In the said drawings, 10 is a base, on which is rigidly secured a standard 11. Secured to the standard 11 and adjustable vertically thereon by means of the bolts 12 and slots 13 are the boxes or bearings 14, in which are mounted the rotary twist-drills 15. On the outer ends of the drills 15 are secured gear-pinions 16, that mesh into a gear-wheel 17, mounted on a pin 18, projecting from the bracket 19, that is secured to and is vertically adjustable on the standard 11 by means of the bolts 20 and slots 21. The shaft 15ª of one of the drills 15 extends beyond the gear-pinions 16 and serves as a means of receiving power. The gears 16 and 17 are so related to each other that the wheel 17 serves as an idle pinion to cause both gear-pinions 16 to drive the drills 15 in the same direction. As the gears 16 may be adjusted up or down and also to and from each other, it is necessary that the gear 17 also be adjustable to accommodate itself to their different positions. The vertical adjustment of gear 17 is made by bolts 20 and slots 21, while the horizontal adjustment is made by means of a set-screw 22 passing through the standard and taking against the lower end of the bracket 19, which has its side adjacent to the standard curved or cut away, so as to fulcrum at the upper bolt 20 to cause the upper end to approach or recede from the pinions 16, according to the adjustment of the set-screw 22. Another standard 23, rigidly secured to the base, carries a slide 24, mounted in horizontal ways, as clearly shown in Fig. 3, which terminates in a portion 25, projecting into the plane of the drills 15 and having secured thereon two brackets 26, provided with guiding-holes for the drills 15. The brackets 26 are vertically adjustable on the slide 24 by means of the bolts 27 and slots 28, (shown in Fig. 3,) so that they may be brought into alinement with the boxes 14. A rod 29, screw-threaded for a portion of its length and provided with nuts 30 and spring 31, is secured at one end to the projecting portion 25, and the other end reciprocates in a circular aperture in a bracket 32, secured to the standard 23. The arrangement is such that the spring 31 acts to push the slide 24 to the right, the movement in which direction is limited by a pin 33 in the rod 29. The location of the pin 33 is such that when the slide 24 is out at its extreme movement to the right the points of the drills 15 will be sheathed in the brackets 26. A set-screw 34 in the bracket 32, coöperating with its end, serves as a stop to limit the movement of the slide 24 to the left. The brackets 26 are provided with vertical beads 35 in the plane of the axes of the horizontal drills 15. When in normal position, the bead 35 projects beyond the points of the drills 15 and acts as a guide for a groove in the last-sections, hereinafter to be described. A slide 36 in the lower part of the projecting portion 25 carries a vertical pin 37, that lies in the plane passing through the axes of the drills 15 and the bead 35. A spring 38 serves to move the slide 36 to the left, while a projection 39 on the slide 36, coöperating with the

right-hand end of the portion 25, limits that movement, so as to retain the pin 37 a certain definite distance from the bead 35, to which it is parallel. On the left-hand face of the projecting portion 25 is a slide 40, which is vertically adjustable thereon by means of the screws 41, that pass through the horizontal plates 42, secured to the top and bottom of the projecting portion 25. From the bottom of the slide 40 a shelf 43 projects to the right under and a little beyond the bead 35. This shelf serves as a support for the section of the last being bored out by the drills 15, and it will be obvious that the location of the holes in the last will be governed by the vertical position of the shelf 43, which is adjustable by means of the screws 41.

The last is turned up in the ordinary manner, and the holes C, D, and E are bored through it transversely. The last is then sawed into two parts along the line F G, so that the axis of the hole C lies in the plane of the cut. A second cut along the line H C removes a wedge-shaped piece and leaves the last in the two pieces A and B, which are to be hinged together. Taking one of these pieces, as B, it is placed in the machine so that the pin 37 enters the hole E and the bead 35 lies in the groove formed by one-half of hole C. The distance from hole C to hole E (and also to hole D) is equal to or slightly more than the distance from pin 37 to bead 35. By this means the spring 38 serves to keep the gorove C in intimate contact with the bead 35. A lever 50, pivoted on the vertical standard 51, secured to the base, serves to push the part B, and consequently the slide 24 and all of the parts carried thereon, to the left, thereby causing the drills 15 to bore holes in the last-section to a depth determined by the set-screw 34. By releasing the lever 50 the spring 31 serves to push these parts again to the right, and thereby the last-section off of the drills 15, so that it (the last-section) may be removed and another put in its place. A detail of the hinge used is shown in Fig. 7, from which it will be seen that a hinge consists of two round pieces M and N, secured together by the hinge-rivet R. The length from the center of R to the end of M or N exactly equals the depth of the holes made in the last-section by the drills 15. The holes D′ and E′ through M and N correspond in size and spacing with the holes D and E in A and B. The holes D′ and E′ may be drilled either before or after the hinges are inserted in the sections of the last. If before, care is taken to have their spacing correct and that they are parallel with the rivet R. The holes made by the drills 15 are of such size that the stems M and N will be a driving fit therein, and the holes D and E are made to be a driving fit for the rivets S and T. The rivets S and T are preferably made with a roughened surface, so that when driven to place they will bind in both the wood and metal.

In carrying out my invention I first turn up the last and then drill the holes C, D, and F. These are preferably drilled all at once by a gang of drills, by which means I maintain parallelism and uniform spacing. I then make the cuts F G and H C, removing a V-block from the space H C F. By means of the bolts 12 and 27 I adjust the distance between the upper and lower drills 15 to correspond to the size of the last and bring the gear 17 into proper mesh with the gears 16. By means of the screws 41 I adjust the height of the ledge or shelf 43, so that the holes made by the drills 15 will be the proper distance from the exterior surface of the last on a selected side thereof. I then adjust the set-screw 34 so that the depth of these holes will exactly equal the distance between the center of the rivet R and the ends of the stems M and N. I then place one of the sections of the last—as, for example, the heel-piece—a selected side down with the hole E on the pin 37 and the groove C on the bead 35. Then by means of the lever 50 I force the section B on the drills 15 as far as it will go in the manner previously described. I repeat this operation on as many other heel-sections as I have lasts of that particular size to hinge. When these are finished, I adjust downward the ledge or shelf 43 a distance previously determined by experiment and go through the same operation on the toe-sections, being careful to always keep downward the same side of the last that was downward when the heel-pieces were bored. This adjusting for the front section of the last is made necessary by the fact that the points of contact between the shelf 43 and the sections of the last, which are shown at K and K′ in Fig. 6, are not equal distances from the center lines of the adjacent hinge. When the holes are properly bored, I drive the hinges into them one at a time, with the rivets R approximately in line. As the depth of the holes corresponds to the length of the stems M and N the center of the rivets R will coincide with hole C when the hinges are driven in as far as they will go. After these hinges are driven into one section the other section is driven on the protruding ends. If the holes D′ and E′ have been previously drilled parallel to the rivets R, the said rivets will be brought into accurate alinement by driving the rivets S and T. If they have not been previously drilled, I aline the rivets R by working the section on the hinges, while the stems M and N are still free to turn in their sockets when force is applied. After alining the rivets R, I run a drill in the holes D and E to drill the holes D′ and E′, after which I drive in the rivets S and T.

While I have shown my invention as applied to boring holes in lasts, it will be understood that it might be applied to any other structures where similar conditions are present and the same relations and adjustment of parts are necessary.

What I claim is—

1. In a machine of the class described, the

combination with a plurality of drills, means for driving them, and means for adjusting the distance between their centers, of devices for holding and guiding the material while being forced upon the drills comprising a plurality of members adjustable relative to each other to correspond to the adjustment of the drills and having apertures therein sheathing the points of the drills when at rest and supporting the drills adjacent to the work during its movement.

2. In a machine of the class described, the combination with a plurality of drills, means for driving them, and means for adjusting the distance between their centers, of adjustable guides for the cutting ends of said drills, projections on said guides for keeping one part of the work perpendicular to said drills, and a work-centering pin for holding the piece to be drilled in proper alinement.

3. In a machine of the class described, the combination with a drill and means for operating the same, of a work-support reciprocating longitudinally of said drill and comprising a longitudinal guide rib or bead coöperating with a complementary groove or depression in the material and arranged at an angle to the axis of the drill and a pin adapted to enter a hole in a side of the material substantially at right angles to the axis of the drill and carried by a spring-pressed slide, the tension of which holds the material in engagement with the bead, the operation of the parts being such that when the material is forced upon the drill the axes of the hole bored thereby and of the previously-formed pin-hole will intersect.

4. In a machine of the class described, the combination with a drill and means for operating the same, of a work-support reciprocating longitudinally of said drill and comprising a longitudinal guide rib or bead coöperating with a complementary groove or depression in the material and arranged at an angle to the axis of the drill and a pin adapted to enter a hole in a side of the material substantially at right angles to the axis of the drill and carried by a spring-pressed slide, the tension of which holds the material in engagement with the bead, and an adjustable stop to determine the penetration of the drill, the operation of the parts being such that when the material is forced upon the drill the axes of the hole bored thereby and the previously-formed pin-hole will intersect.

5. In a machine of the class described, the combination with a plurality of drills and means for operating the same, of a work-support reciprocating longitudinally of said drills and comprising a longitudinal guide rib or bead coöperating with a complementary groove or depression in the material and arranged at an angle to and intersecting the axes of all of the drills and a pin adapted to enter a hole in a side of the material substantially at right angles to the axes of the drills and carried by a spring-pressed slide, the tension of which holds the material in engagement with the bead, the operation of the parts being such that when the material is forced upon the drills, the axes of all the holes formed thereby will be intersected by the axis of the previously-formed pin-hole.

6. In a machine of the class described, the combination with a plurality of drills, means for driving them, and means for adjusting the distance between their centers, of a device for holding and guiding the material while being forced upon the drills comprising a plurality of members adjustable relative to each other to correspond to the adjustment of the drills and having apertures therein sheathing the points of the drills when at rest and supporting the drills adjacent to the work during its movement, said members also having projections thereon coöperating to form a guide-rib for holding the material in position.

7. In a machine for boring holes in last-sections for the insertion of hinges, the combination with a plurality of parallel drills, means for driving them, and mechanism for adjusting them to vary the distance between their centers; of a work holding and guiding support comprising blocks sheathing and guiding the drills, means for adjusting the blocks on the support to correspond with the adjustment of the drills, means for reciprocating said support and drills longitudinally of the drills and relative to each other to feed the material, and a guide-rib formed by beads on said blocks to coöperate with a groove in the last-sections, substantially as described.

8. In a machine for preparing last-sections for hinging, the combination of a framework, a plurality of drills therein for boring holes in the opposed faces of such sections for the reception of hinges, and means for driving the drills; with a gage or guiding-plate located on said frame and coöperating with the irregular outer surfaces of the section where said irregular surfaces are intersected by the said opposed faces, supporting mechanism for holding each of said sections with its said opposed face at right angles to the axes of said drills, said mechanism coöperating with said irregular surfaces at a fixed distance from their point of contact with the gage or guiding-plate; and means for adjusting said gage or guiding-plate on said frame nearer to or farther from the drills to compensate for the vertical distance of the surface coöperating with said support in the heel-sections above the corresponding surface in the toe-sections.

9. In a machine for preparing last-sections for hinging, the combination of a framework, a plurality of drills therein for boring holes in the opposed faces of such sections for the reception of hinges, means for driving the drills, and means for adjusting the distance between the centers of said drills, with a gage or guiding-plate located on said frame and coöperating with the irregular outer surfaces

of the section where said irregular surfaces are intersected by said opposed faces, supporting mechanism for holding each of said sections with its said opposed face at right angles to the axes of said drills, said mechanism coöperating with said irregular surfaces at a fixed distance from their point of contact with the gage or guiding-plate; and means for adjusting said gage or guiding-plate on said frame nearer to or farther from the drills, independent of the adjustment of said drills relative to each other, the adjustment of said gage or guiding-plate serving to compensate for the vertical distance of the surfaces coöperating with said support in the heel-sections above the corresponding surfaces in the toe-sections.

10. In a machine for preparing last-sections for hinging, the combination of a framework, a plurality of drills therein for boring holes in the opposed faces of such sections for the reception of hinges, and means for driving the drills; with a gage or guiding-plate such as the shelf 43 located on said frame and coöperating with the irregular outer surfaces of the section where said irregular surfaces are intersected by the said opposed faces, supporting mechanism such as the pin 37 carried by the slide 36 for holding each of said sections with its said opposed face at right angles to the axes of said drills, said supporting mechanism coöperating with said irregular surfaces at a fixed distance from their point of contact with the shelf 43; and means for adjusting said shelf 43 on said frame nearer to or farther from the drills, substantially as and for the purpose described.

11. In a machine of the class described, the combination with a plurality of drills, and means for driving them, of guiding devices for the material consisting of, first, a vertically-disposed guide for locating the work with respect to the axes of said drills, second, a vertically-adjustable shelf coöperating with the irregular outer surface at a distance from the edge of the surface to be bored for determining the distance at which one of said drills shall penetrate above the horizontal surface of the work, and third, a pin adapted to enter an opening previously made in the work in one of the sides substantially at right angles to the surface to be drilled.

ERNEST A. EASTMAN.

Witnesses:
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M. REGNER.