

(No Model.)

2 Sheets—Sheet 1.

A. HIRSHHEIMER & C. M. MUELLER.
MACHINE FOR BENDING WOOD.

No. 466,017.

Patented Dec. 29, 1891.

Fig. 1.

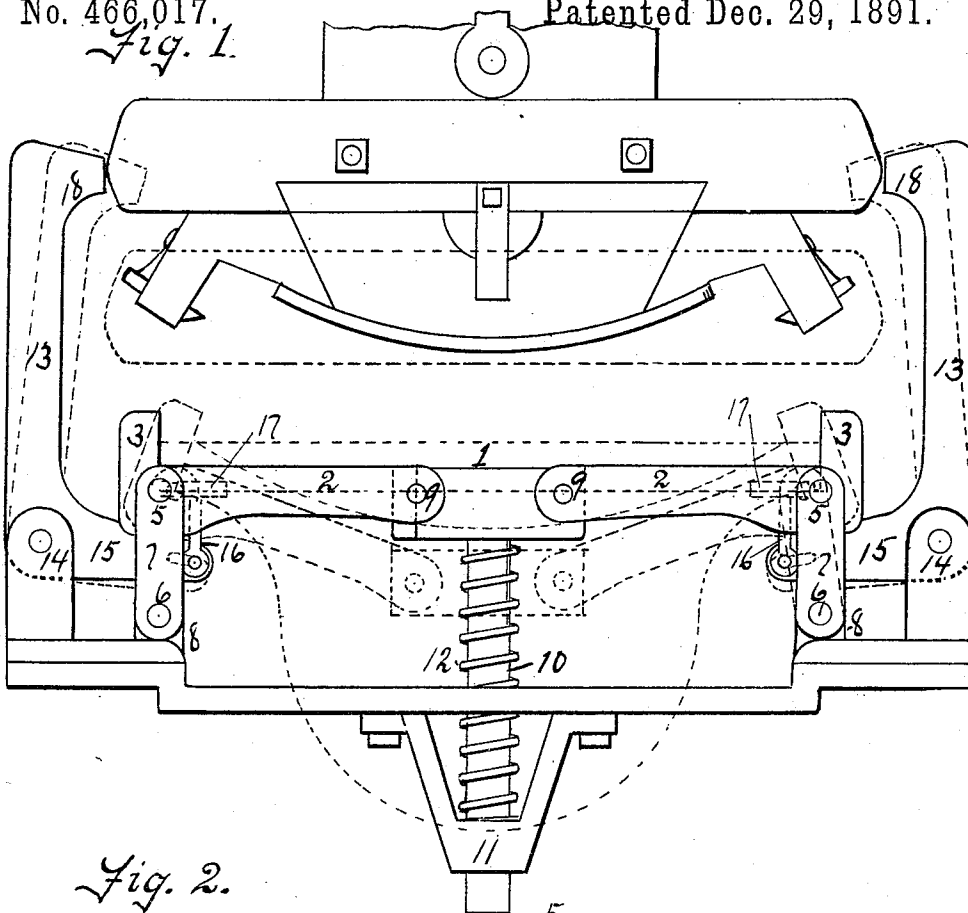
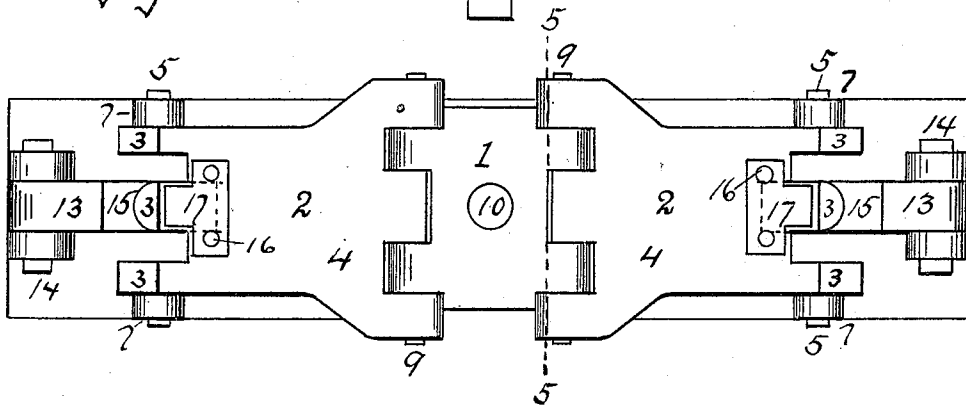


Fig. 2.



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BY

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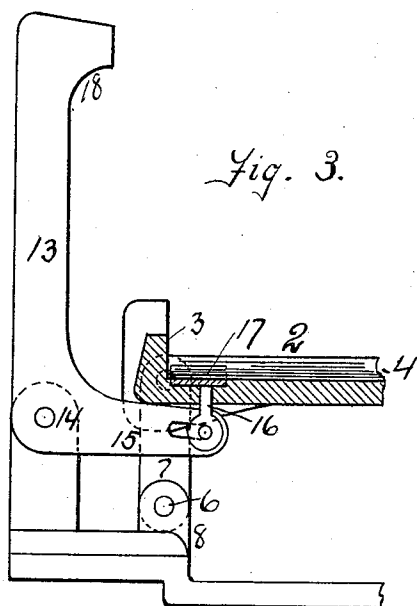


Fig. 3.

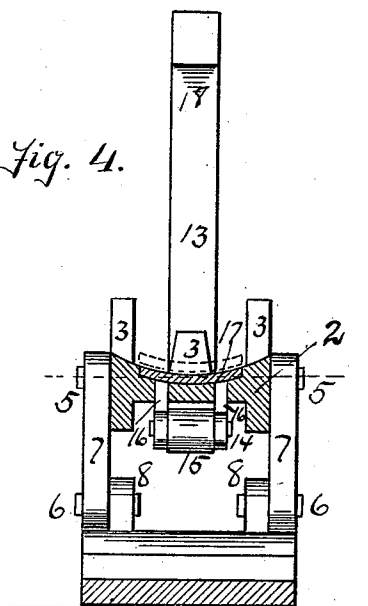
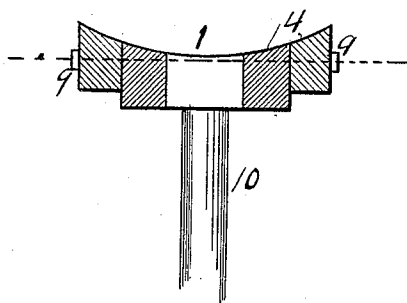


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

ALBERT HIRSHHEIMER AND CHARLES M. MUELLER, OF LA CROSSE,
WISCONSIN.

MACHINE FOR BENDING WOOD.

SPECIFICATION forming part of Letters Patent No. 466,017, dated December 29, 1891.

Application filed September 30, 1890. Serial No. 367,377. (No model.)

To all whom it may concern:

Be it known that we, ALBERT HIRSHHEIMER and CHARLES M. MUELLER, citizens of the United States, residing at La Crosse, in the county of La Crosse and State of Wisconsin, have invented certain new and useful Improvements in Machines for Bending Wood; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in machines for bending wood; and the object is primarily to apply the power in such a manner and at such points that the fibers of the wood shall be compressed longitudinally at the same time and to the same extent that pressure is exerted in a lateral direction.

The invention is an improvement upon the construction shown in Letters Patent Nos. 391,794 and 426,641, for machines for bending staves, granted to us October 30, 1888, and April 24, 1890, respectively.

The particular features of this invention consists in the construction of the bending-bed, whereby an even resistance to the bending-pressure is exerted at all points, the bed only yielding sufficiently to admit of the proper degree of curvature at any point in the operation; in the construction and arrangement of the bed in connection with the shouldered end brackets, whereby pressure is exerted to upset and compress the side edges of the blank for the purpose of bending the blank longitudinally and crosswise at the same time; in the construction of the brackets upon which the bed turns, and in the devices employed for throwing the bent wood and the former upon which it is clamped off the bed when the operation of bending is completed.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 represents a front view of the invention; Fig. 2, a plan view of the bed; Fig. 3, a longitudinal section of a portion of the bed, showing the operation of the throwing-

off device; Fig. 4, a cross-section of the same, and Fig. 5 a vertical cross-section of the bed through one of the joints.

The method of applying the power and the general operation of the various parts is similar to that illustrated in our previous patents hereinbefore mentioned, and hence the description and illustration herein will be confined to the special features forming the subject-matter of this specification.

The principal features of invention consist in the construction of the bed 1, upon which the blank rests during the operation of bending. This is constructed in several sections, pivoted together in the manner of a hinge at their adjacent extremities to adapt them to form collectively a substantially curved surface upon the application of pressure to the middle sections of the same. The end sections 2 2 of the bed are substantially similar in form to the tilting bracket-sections shown in our previous patent, having shoulders 3 3, against which the ends of the blanks abut, and a blank-supporting surface 4. We also make use of the former described in said patent.

The end sections 2 are mounted upon pivots 5, so as to turn upon an axis which lies in the same plane as the shoulders, which axis is also in line with or, for reasons hereinafter stated, slightly below the point at which said plane is intersected by the blank-supporting surface. The sections 2 are pivoted upon and have bearings in two links or supports 7 7, which are also hinged or pivoted, as at 6 6, to upright lugs 8 8, formed upon the table or upon a standard mounted thereupon. The brackets are so mounted upon the table that the distance apart of the axis upon which the supporting-links turn and the axis upon which the tilting section turns or apex of the angle formed by the abutment and blank-supporting surface and the distance apart of the axes 6 6 is the same as stated in our before-mentioned application—that is to say, the distance apart of the two axes 5 and 6 of the same bracket and the distance apart of the axes 5 6 of the two opposite brackets have such relation to each other that the former is equal to one-half the difference in length of the semi-circumference and the diameter of

a circle having a semi-circumference equal in length to said last-named distance. The distance between the abutments 33 of the opposite end sections when in normal position, or, what is the same thing, the distance apart of the opposite axes 6 6, being represented by a straight line, the distance between the apex of the angle formed by the abutment and blank-supporting surface and the axis 6 of the same bracket, or, which is the same, the distance apart of the two axes 5 and 6, is equal to one-half the difference in length of said straight line and the diameter of a circle whose semi-circumference has the same linear dimension as said straight line. It will be observed that in order to sustain the above relations the axes 5 and 6 normally or when in position for receiving the blank lie in the same vertical plane with the face of the abutment 3.

Upon the commencement of a downward pressure upon the middle of the bed the top of the abutments 3 3 are thrown slightly toward each other, firmly grasping the ends of the blank, while a further pressure tilts the end sections upon both the axes 5 and 6.

The axes 9 9, upon which the several sections of the bed are hinged, are in or slightly below the plane of the surface of the bed, as shown in Fig. 5. When the machine is to be used for bending in a longitudinal direction only, the surface of the bed is a plane; but when employed for the purposes for which it is especially intended—namely, the bending of staves—the entire surface of the bed is concaved, so that when the parts are depressed they assume the form of the exterior of a finished stave. For this purpose, also, the centers or axes 9 9, upon which the several sections are hinged together, as well as the axes 5 5, upon which the end sections tilt, may be located slightly below the plane of the surface of the bed, or below the lowest point of the same when the bed is concaved. Ordinarily we have found that about one-sixteenth of an inch below the plane is a sufficient distance, the object of this construction being to cause a slight gradual diminution in the length of the bed between the opposite abutments, as the face of the bed becomes gradually more curved. In the case of the concave bed for stave-bending, however, there is a further object gained by the location of the axes in or slightly below the plane of the lowest point of the bed. It will be readily seen by reference to Fig. 1 that, the axes of the sections being as low as the middle of the face of the bed, the edges project above the same to an extent corresponding to the degree of concavity. It therefore follows that upon the depression of the bed the distance from abutment to abutment upon the edge of the bed is shorter than the distance between the abutments in the line of the center of the bed, and that the former distance constantly decreases as long as the pressure is kept up, the joints being left open

to such an extent as not to bind, as shown in Fig. 2. The effect of this shortening of the sides of the bed is to cause the abutments to exert a greater degree of pressure upon the edges than upon the middle of the blank, and this pressure, in connection with the concavity of the bed and the convexity of the face of the former, causes the edges of the blank to be upset to take the desired form without danger of splintering or parting of the fibers of the wood at any point. The stave is thus bent in both directions to the exact form it will assume in the finished barrel, and from the construction of the former, as set forth in our previous patent, is so clamped until the fibers are set in that form.

The bed may be composed of any desired number of sections hinged together, as before specified. We have, however, shown it as composed of two end sections and a single middle section, to which the former are hinged at the opposite ends. To assist in returning the bed to its horizontal position after the operation of bending is completed, the middle section is preferably mounted upon a post or bar 10, moving vertically in slide-bearings 11 and provided with a spring 12, coiled thereupon. Pressure upon the bed compresses the spring, and when the pressure is released the elasticity of the spring acts to restore the bed to its former position, as set forth in our pending application.

It has been found that by reason of the heavy pressure necessary to bend heavy blanks it is difficult to remove the blanks and former from the brackets. In our previous application we have described a pair of grappling-hooks attached to the presser-die and adapted to engage underneath the middle of the bed and raise the same on the upstroke of the die, thereby disengaging the blank from between the abutments. As an improved device for the same purpose and which is found to act with much greater efficiency, we employ an elbow-lever 13, mounted at each end of the table by means of a pivot 14, and having one of its arms 15 extending underneath the tilting end section of the bed. The other arm extends upwardly beside the presser-die. To the arm 15 is connected by upwardly-extending fingers 16 a plate 17, countersunk in the upper surface of the bed close to the base of the abutment and normally flush therewith. When the upwardly-extending arms are pressed outwardly, the plates are lifted above the surface of the bed, thereby forcing the blank away from the same. The elbow-levers are operated by means of cams connected with and moving with the presser in position to engage with inclined or cam faces 18 upon the inner sides of the upwardly-extending arms. When the die descends, the arms are cleared; but the latter being forced inwardly by the downward pressure upon the bed the upper arms are forced into the path of the cams and engaged thereby on the upward

stroke, forcing the arms apart. The plates in the bed are thus thrown above the surface of the same and the blank released from the bed.

It should be specially noted that the same construction in its general features may be employed for bending work in which curvature is required only in the direction of the length of the blank, the only change necessitated being that the upper surface of the bed should be plane instead of concaved and space left between the brackets for the full degree of curvature. Any curve up to a semicircle can be readily bent in the same manner as disclosed in our previous patents above cited.

The direction in which power is applied may be reversed without changing any essential feature of the mechanism—as, for instance, by pulling the table downward from below. Such changes of construction are not shown, being such as would readily suggest themselves, and depend largely upon the requirements of each particular case.

We claim as our invention—

1. In a machine for bending wood, bracket-sections having blank-supporting surface or bed and upright shoulders adapted to abut against the end of the blank, pivotally mounted upon tilting links or supports, in combination with one or more intermediate sections hinged to the adjacent ends of said bracket-sections and to each other and forming a continuation of said blank-supporting surface, substantially as set forth.

2. In a machine for bending wood, the bracket-sections having concave blank-supporting surface or bed and upright shoulders adapted to abut against the end of the blank, the said sections being pivotally mounted upon tilting links or supports, in combination with one or more intermediate bed-sections having similarly-concaved surface hinged to the adjacent ends of said end sections and to each other and forming a continuation of said blank-supporting surface, substantially as set forth.

3. In a machine for bending wood, a bed formed of end sections, provided with blank-supporting surfaces and upright shoulders adapted to abut against the end of the blank, the said end sections being pivoted between tilting link supports, intermediate bed section or sections hinged to the adjacent extremities of the end sections and to each other, the axes of said hinge-joints and the axes upon which said end sections tilt lying in or slightly below the plane of the said supporting-surface, substantially as set forth.

4. In a machine for bending wood, the brackets having blank-supporting surfaces and upright shoulders adapted to abut against the ends of the blank, pivots upon which said brackets are adapted to tilt, located in the plane of the said upright shoulders and in or slightly below the line where said plane is in-

tersected by the blank-supporting surface, and hinged or pivoted supports in which said bracket-pivots have their bearings, substantially as set forth.

5. In a machine for bending wood, brackets having blank-supporting surfaces and upright shoulders adapted to abut against the ends of the blanks, pivots upon which the said brackets are mounted, located in the plane of the said upright shoulders and in or slightly below the line where said plane is intersected by the blank-supporting surface, and hinged or pivoted link supports in which said bracket-pivots have their bearings, the distance between the bracket and the link pivots in each bracket having such a relation to the distance apart of the link pivots of the opposite brackets that the former is equal to one-half the distance in length between the semi-circumference and the diameter of a circle having a semi-circumference equal said last-named distance, substantially as set forth.

6. In a machine for bending wood, a bed composed of three or more sections, hinged together at their adjacent ends and forming a continuous blank-supporting surface, the end sections having upright abutments adapted to abut against the ends of the blank resting upon said surface, supports upon which said end sections are hinged, movable in the direction of the length of the bed, and the axes of the intermediate joints lying in or slightly below the plane of said surface, substantially as and for the purpose specified.

7. In a machine for bending wood, a bed composed of three or more sections hinged together at their adjacent ends and having their upper surfaces concaved, forming a continuous concave blank-supporting surface, and supports upon which said end sections are hinged, movable in the direction of the length of the bed, the axes of the intermediate hinged joints passing through or slightly below the lowest point in the concave surface at that point, substantially as and for the purpose herein set forth.

8. In a machine for bending wood, a reciprocating die, means for actuating the same, tilting brackets having blank-supporting surface pivoted at equal distances upon each side of the path of the same, elbow-levers pivoted outside said brackets, having one arm extending upwardly and the other underneath said supporting-surface, finger or fingers extending from said arms through said supporting-surfaces, and means, substantially as described, for moving outwardly the upwardly-extending arms of said levers upon the return stroke of the die, substantially as and for the purpose herein set forth.

9. In a machine for bending wood, a bed composed of three or more sections hinged together at their adjacent ends and having their upper surfaces concaved, forming a continuous concave blank-supporting surface, and

supports to which the end sections are hinged,
movable in the direction of the length of the
bed, the centers of the pivots of said end sec-
tions being slightly below and of the pivots
5 of the intermediate section or sections in or
below the line of the lowest part of the con-
cave surface at that point, substantially as
and for the purpose specified.

In testimony whereof we affix our signatures
in presence of two witnesses.

ALBERT HIRSHHEIMER.
CHARLES M. MUELLER.

Witnesses:

SARA L. FOX,
JOHN GOTTLIEB.