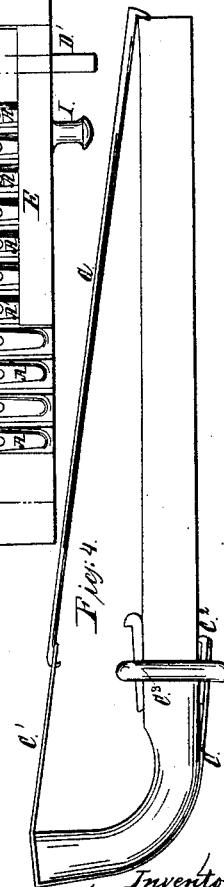
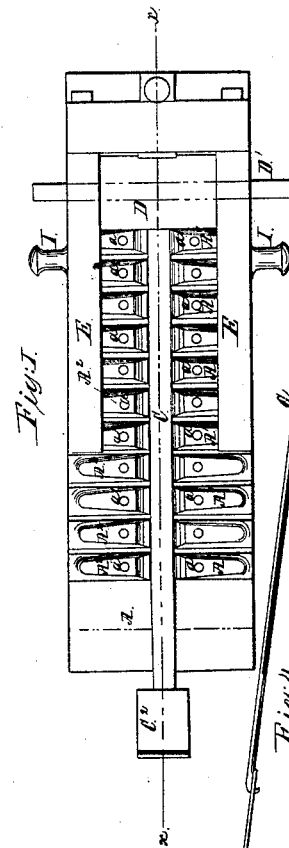
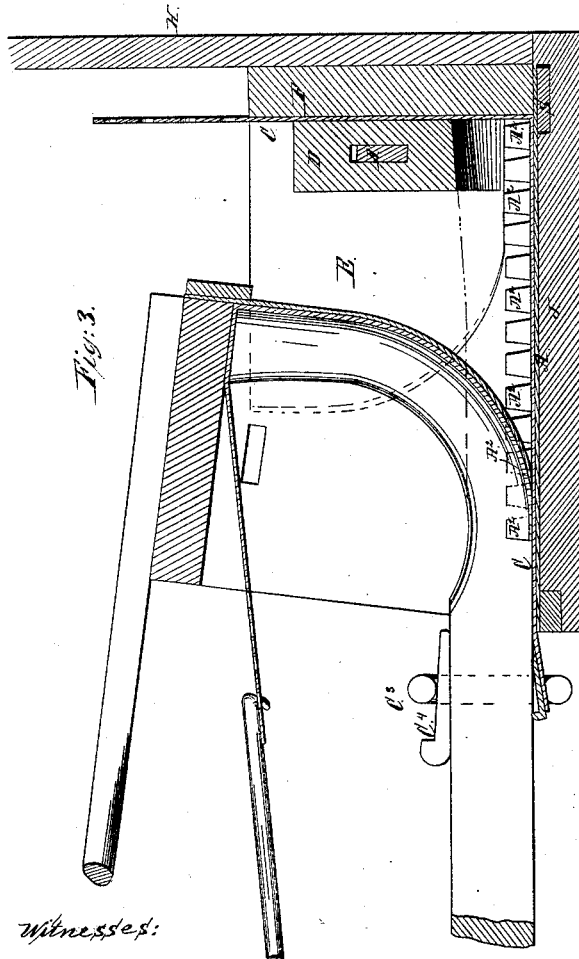
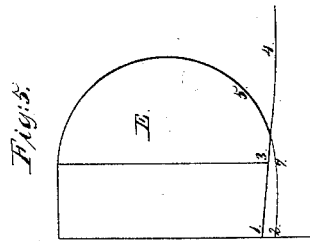
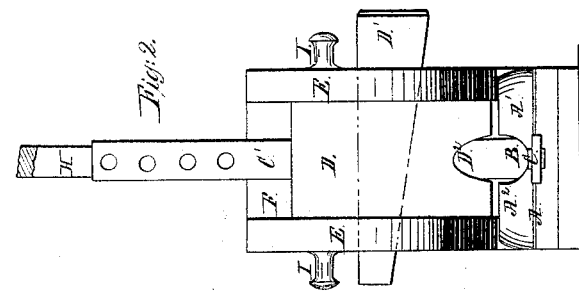


*J. M. Ray,*  
*Bending Wood.*

*N<sup>o</sup> 45,457.*

*Patented Dec. 13 1864.*



*Witnesses:*  
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# UNITED STATES PATENT OFFICE.

JAMES N. RAY, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO HIMSELF AND JOHN M. WHEATLEY, OF SAME PLACE.

## IMPROVEMENT IN WOOD-BENDING MACHINES.

Specification forming part of Letters Patent No. 45,457, dated December 13, 1864.

*To all whom it may concern:*

Be it known that I, JAMES N. RAY, of Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Machines for Bending Wood; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan or top view of my improved machine. Fig. 2 is an end view thereof. Fig. 3 is a vertical longitudinal section of the same, the plane of section being indicated by the line *xx*, Fig. 1. Fig. 4 is a detached view, illustrating the manner of holding the wood in its bent position after it is loosened from the bending-strap. Fig. 5 is a side view of the common grooved form with a section of the handle in position, intended to show the novel shape of a form, whereby a swell-ended handle is bent, and the outer edge of the handle made to describe a perfect circle.

My invention consists chiefly in the employment of a bending-strap of novel construction for bending wood or other substances into plow-handles or other articles. In conjunction with this bending-strap my invention includes the use of sundry other devices, which, though of minor importance comparatively, perform important functions in connection with the bending-strap, all of which will be hereinafter fully explained.

In order that others skilled in the art to which my invention appertains may be enabled to fully understand and use the same, I will proceed to describe its construction and operation.

To form the bending-strap A, I use a thin strap of metal, about seventeen inches long and about five inches wide, and thin enough to be easily flexible. Upon the face of this strap I fasten, by rivets *a*, Fig. 1, two rows of segments, (marked *A'* *A*<sup>2</sup>, respectively,) which, when made of any hard material, are rounded on their under sides equal to the smallest arc contemplated in bending, their sides converging toward the top, so as to allow them to be folded inward in an arc as small as required. The respective rows of segments *A'* *A*<sup>2</sup> are so ranged on each side of the longitudinal center of the flexible strap A that between the proximate ends of the segments will be left

the groove B, Fig. 2. The proximate ends of the segments are so shaped as to form the sides of a round or oval groove, the outline of which will converge at the bottom upon the face of the strap. The inferior and proximate ends of the segments are cut off, so as to leave a flat bottom to the groove, composed of the face of the bending-strap, equal to about one-half inch in width, as shown clearly in Fig. 2. If some elastic substance is used to form the side walls of the groove, then two segments only will be used—one on either side the longitudinal center of the strap. The end contemplated in the construction of this flexible groove is threefold: First, the groove provides lateral support for an oval-backed handle, which prevents it from rolling, from warping, and from spreading in the act of bending; second, its flat bottom allows the strap to press continuously and heavily upon the spine or back of the handle, during the whole act of bending, whereby the raising of splinters is prevented in the most effectual manner; third, the flat bottom of the groove affords space in which to lay a back-strap, C, Fig. 1, which, after the handle is bent, is fastened at its two ends, as shown in Fig. 4, and the back of the handle thus protected from splintering, after it is delivered from the bending-strap and until it has become cool and acquired a set, as effectually as if it had been so long retained in the bending-strap, the use of the back-strap, as an auxiliary to the bending strap, operating to save the manufacturer from the expense of providing more than one bending-strap for each operator.

I do not confine myself to a round or oval-shaped groove, but contemplate a square groove, or a groove of any other desirable shape.

The back-strap is bent at right angles near the middle, one end being about eighteen inches long and the other end about sixteen inches long and about one-half inch broad, so as to lie in the bottom of the groove, and having a clip, C<sup>2</sup>, riveted upon the end, which is about one and one-half inches wide and about two inches long, with the end sharpened and bent upward, at right angles, as shown in Fig. 1. The short angle or arm C' of the back-strap may be one inch broad, has eight or ten holes punched in the end of it, about one-half

inch apart, as shown in Fig. 2. The two divisions of the back-strap C C' are shown in Fig. 4 in working form. The clip on the end of the back-strap is of iron, about one-eighth of an inch thick. The clip shown in the drawings has but one edge to indent the wood. It is better if made of cast-iron with four or six edges.

In addition to the segmental groove and the auxiliary back-strap, as described, the bending-strap is provided with a head, E, and lever H, as shown clearly in Fig. 3, permanently attached. To this head is made fast by bolts two forms, E, as shown in Figs. 1 and 2. To these forms are attached two wrists, I I, as shown in Figs. 1 and 2. Between these forms is adjusted a follower, D, Fig. 1, 2, and 3. Through these forms and this follower is provided a key-hole, wherein rests the key D', as shown in Figs. 1, 2, and 3. These are appendages of the bending-strap, and perform important offices connected with it. All the parts described are made of metal, except the follower, which may be made of wood.

The head F, Fig. 3, is about eight inches long and about two inches thick, of cast-iron. (The head is better formed with a flange on the foot, about three-fourths of an inch thick, projecting backward for the convenience of attachment to the strap.) To attach it to the strap, take a piece of iron about half an inch thick, equal to the width of the strap in one line, and one inch broader than the head in the other line. Drill through this three or four holes; make corresponding holes in the strap and the foot of the head; then fasten the three together by screws, rivets, or bolts, so that one inch of the thin plate will extend back under the strap to support the strap when the key is made to force the end of the handle firmly into the groove.

The forms are made fast to the head by screws or bolts, or the head and forms may be cast in one piece. The forms are made in pairs of any desired shape, but always so shaped and so fit upon the head as by resting upon the segments, or upon the strap outside the segments, in the act of bending, to compel the strap to bend in accordance with their shape. Sometimes the forms will not be more than about four inches broad from the face of the head, and so formed as to not touch the segments or the strap. In that case a common grooved form, like E, Fig. 5, or its equivalent, will be used, or the two forms E, Figs. 1, 2, and 3, may be used in combination with the common grooved form, Fig. 5, or without a form of any kind the curvature of the strap may be left to the control of the segments. The follower D is as wide laterally as the space between the forms. It is about two inches thick. The lower end is grooved, as shown at D<sup>2</sup>, Fig. 2, so as to hold the end of the handle-edge up, as well as firmly down, in the bending-groove.

E, Fig. 5, is the outline of a form, resting in

place upon the end of a handle, expanded by a straight or curved line from a width of one and one-half inches in its body to two inches (more or less) at the end, the swell running back from the end about four inches, while that part of the form additional to a semicircle is only three inches. This diagram is introduced to show that to compensate for the swell in the handle from 4 to 1 2, a corresponding width of surface is cut from the form extending from 1 2 to 5, so that when the handle is bent the swell in the handle will lay inside the true arc of the circle and allow the outer edge or back of the handle to form a perfect arc.

C<sup>3</sup>, Fig. 3, is a common iron clamp, (not new.) It is formed of round half-inch iron seven inches long when straight, the two ends bent in the same line at right angles, so as to span three and a half inches. The wedge C<sup>4</sup> is made of wood, about six inches long, one inch square at one end and dressed to a flat edge at the other end. It is used to tighten the clamp C<sup>3</sup> upon the clip C<sup>2</sup>, to indent its point or points into the handle, to hold the back-strap from slipping.

G, Fig. 4, is a rod of iron about forty-four inches long, bent at the two ends so that one end may hook over the end of the handle and the other end hook into one of the holes in the free end of the back-strap. It is used to hold the handle in its bent form after it is loosened from the bending-machine, as shown in Fig. 4. It is made of one-fourth inch round rod-iron. One end may be sharpened to enter the holes of the back-strap.

The wrists I I, Fig. 1, are screwed into holes in the forms, and are attached thereto with a view to attach to them any contrivance which may be most convenient to hold the forms down upon the bench and to make them move horizontally in the act of bending, thereby to compel the handle to bend consecutively and thus prevent the evil of crimping. The lever H is about four feet long and is usually made of wood.

The lengths, breadths, and proportions herein named will be varied to serve various ends.

J, Fig. 3, is a small section of the bench to which the bending-machine is attached for use. It should be about eight feet long, about four inches thick, and from two to four inches broader than the bending-strap. The head of the strap when laid on this bench should rest near one end, and the other end of the strap should be made fast to the bench by means of bolts or screws through a plate of iron previously riveted to the under side of this end of the strap. At the other end of the bench, about five feet three inches from the head of the bending-strap, a common bench-screw is attached, which is used to hold the handle firmly against the head of the bending-strap, thereby to prevent the back of the handle from breaking or splintering in the act of bending. At the point answering to the clip

C<sup>2</sup>, Fig. 3, on the end of the back-strap, the top of the bench must be cut down about two inches deep and three inches wide to admit the clip C<sup>2</sup>, and to afford room for the hand in fixing the clamp C<sup>3</sup> under the clip ready for the wedge.

To bend a handle, remove the key and follower; place a back-strap in position, as shown in Fig. 1; lay upon it a handle, as shown in Fig. 3; place the follower in position; insert the key and strike it briskly with a light hammer; tighten the screw at the foot of the handle firmly, but moderately; seize the lever by the end and bend it over to a horizontal position, as shown by the red lines in Fig. 3; while holding the lever down with the left hand take the rod G in the right hand, and, hooking one end of it under the foot of the handle, insert the other end in one of the holes of the back-strap; then let go of the lever; take a short clamp in the left hand and a wedge in the right hand; place the clamp C<sup>3</sup> in position with the left hand; fix the wedge in position with the right hand; then with the right hand strike the wedge a gentle blow, so as to make the clip to indent the wood, but not cut it; loosen the screw at the foot of the handle; elevate the handle and lever together; remove the key, and take out the handle, when it will be as shown in Fig. 4.

Each bending-machine is provided with from two hundred to three hundred back-straps, and a corresponding number of clamps, rods, and wedges. If the wood is half-seasoned before bending, the handles may be taken out of the back-straps after ten or twelve hours.

Having thus described my invention, and the mode of using it, I will now state what I claim as new therein, and desire to secure by Letters Patent—

1. In a wood-bending machine, the flexible groove, formed by fixing upon the face of a plain strap of flexible metal two rows of segments of any suitable material, so shaped as to form the walls of the groove, while the strap itself forms the bottom thereof, substantially as herein set forth.

2. The combined use of the bending-strap and back-strap, substantially as herein set forth.

3. The combined use of the clip, the perforated back strap, the rod G, the clamp, and the wedge, as a means of holding the bent handle until it is cool and firmly set, substantially as herein set forth.

4. The forms E, when attached to the head F and used to tread upon the segments or upon the strap outside the segments, substantially as herein set forth.

5. The wrists I I, in combination with the forms E, when used to make said forms move horizontally, and to prevent them from rising from the bench in the act of bending, substantially as herein set forth.

6. The combined use of the head F, the forms E, and the follower D, substantially as herein set forth.

JAMES N. RAY.

Witnesses:

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CHARLES D. SMITH.