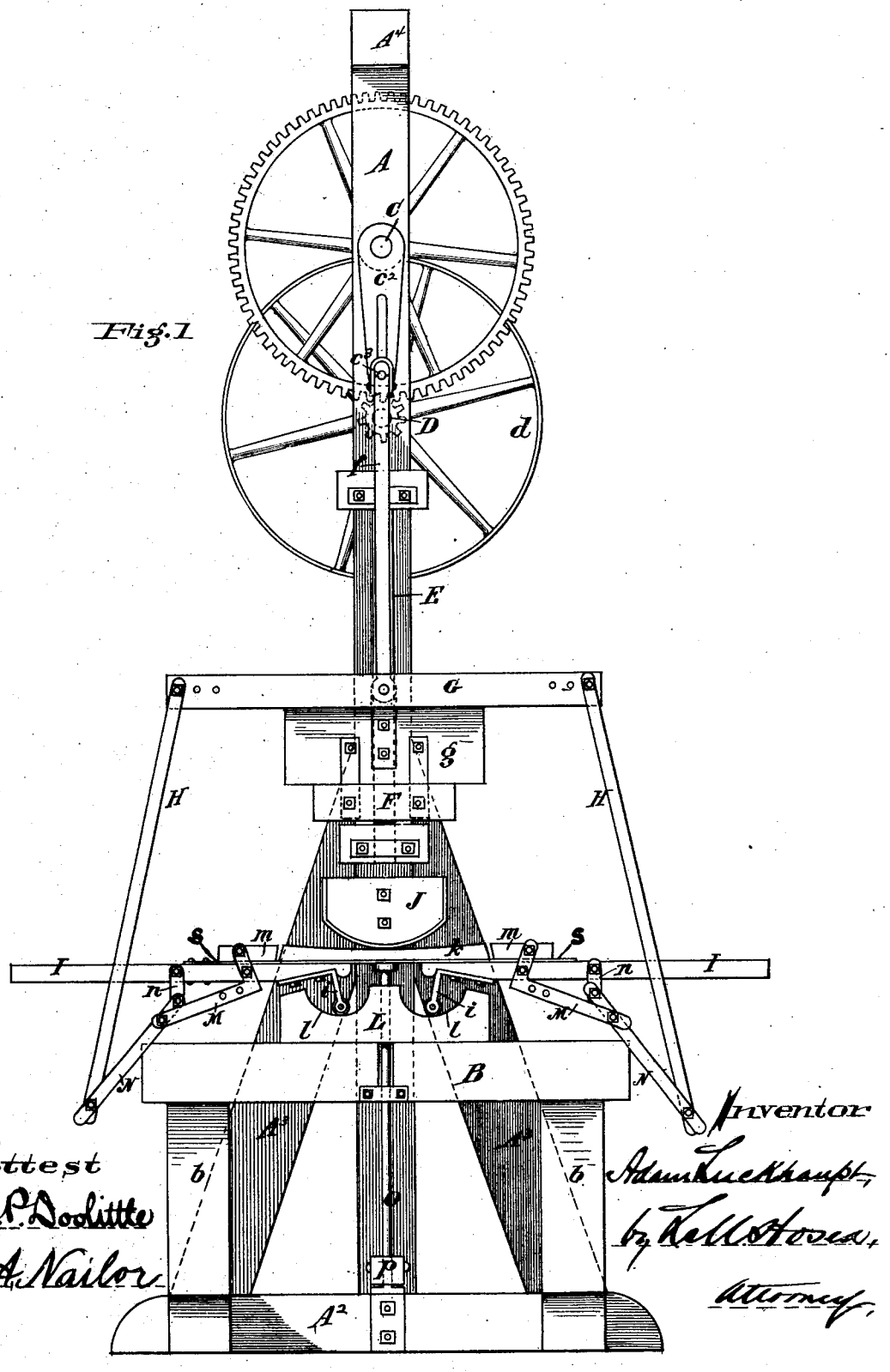
(No Model.) 2 Sheets—Sheet 1.

# A. LUCKHAUPT.

## WOOD BENDING MACHINE.

No. 245,187. Patented Aug. 2, 1881.

Fig. 1




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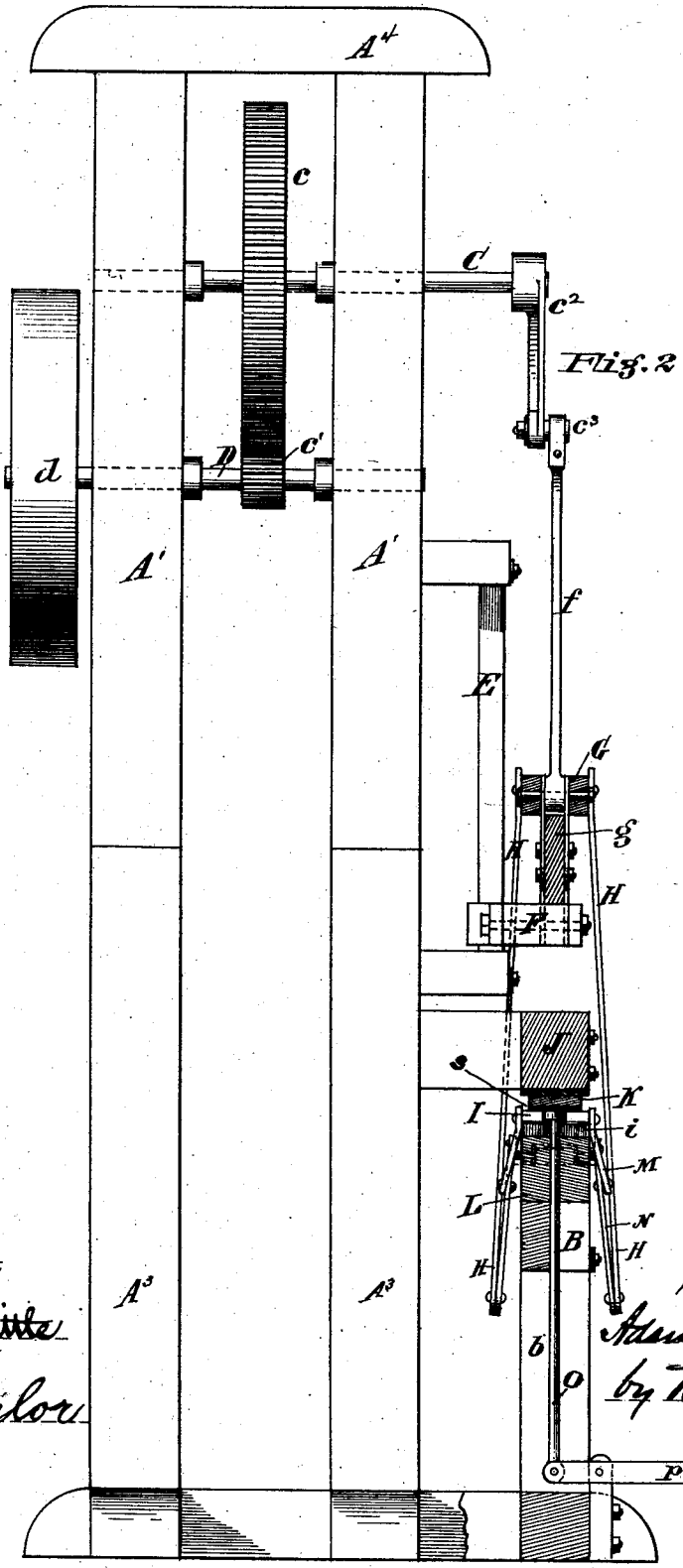



Fig. 2.

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# UNITED STATES PATENT OFFICE.

ADAM LUCKHAUPT, OF COLUMBUS, OHIO.

## WOOD-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 245,187, dated August 2, 1881.

Application filed June 7, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, ADAM LUCKHAUPT, a citizen of the United States, residing at Columbus, Franklin county, Ohio, have invented new and useful Improvements in Wood-Bending Machines, of which the following is a specification.

My invention relates to machines for bending wood, such as barrel-staves, wheel-fellies, &c., its object being to prevent overstraining and breaking the outer fibers of the wood, and at the same time to facilitate the operation and economize the time and power employed.

To this end my invention consists in the mechanism hereinafter described, as organized for continuous operation, and in the combination, construction, and arrangement of certain parts in detail, as more particularly pointed out and claimed.

My invention is embodied in mechanism illustrated in drawings accompanying and illustrating this specification, similar letters of cross-reference being used to indicate the parts referred to and shown.

Figure 1, as exhibited in the drawings, is a front elevation, and Fig. 2 a side elevation, of my wood-bending machine complete.

As represented in the drawings, the machine consists, in the main, of a vertical supporting-frame carrying at the upper part a crank-shaft driven by gearing, with which is connected a vertically-moving cross-head operating a system of levers and blocks, by which the stave is bent upward around a form secured upon the frame.

The frame consists of two upright stanchions, A A′, stepped into a base-piece, $A^2$, from which they are laterally supported by diagonally-placed struts $A^3$, and connected at the top by a brace, $A^4$. In front of the main stanchion A is a table, B, rising to a convenient height and supported on legs *b* from the base $A^2$.

At the upper part of the frame is journaled a crank-shaft, C, driven by a spur-wheel and pinion, *c c′*, from a counter-shaft, D, journaled below it in the frame. A belt-pulley, *d*, at the rear extremity of the counter-shaft, receives the driving-power, which is communicated by the spur-gearing to the crank-shaft *c*, to the forward extremity of which is secured a crank, $c^2$, radially slotted to permit the adjustment of the crank-pin $c^3$, and thus determine the throw of the crank.

Below the crank-shaft is a vertical guide, E, on which a cross-head, F, is caused to reciprocate by means of a pitman, *f*, connected with the crank-pin.

To the cross-head is attached a horizontal arm, G, supported by blocking *g*, and from the ends of the arm depend links H, connecting with a system of levers, whose connection and arrangement will presently be described.

Two pressure-bars, I I, having their inner ends separated by a short interval, are arranged in the same horizontal line beneath and in the plane of a former-block, J, secured by bolts to the upright stanchion A, just below the guide E. The inner ends of the pressure-bars I are separated by a short interval, and upon them rests the bending-strap *s*, which is a band of spring-steel extending across between the pressure-bars I and longitudinally each way about half their length, and secured to the pressure-bars by retaining-bolts near its ends, thus connecting the pressure-bars longitudinally and forming a surface on which the stave or piece of wood to be bent is placed to undergo the bending operation. The pressure-bars are supported at their contiguous ends by short legs *i i* bolted thereto, which project downward approximately at right angles and rest in curved guideways *l l* formed in the upper surface of a block, L, which rests upon the table B beneath the former-block. The lower ends of the legs *i i* are preferably provided with friction-rollers, as shown. The outer ends of the pressure-bars are suspended by the links H H and the systems of levers before referred to, which are similar for the two bars. Each system consists of two levers, the first of which is bent to form a right-angled bell-crank, M, pivoted at or near its apex to the pressure-bar I, and connected at the extremity of its short arm with a block, *m*, arranged to slide upon the surface of the bending-strap *s* and form, with its corresponding member, the end clamps for the stave undergoing the bending operation. The extremity of the long arm of the lever M is pivoted to and between the bearing-pivots of a second lever, N, whose inner extremity is supported by a short link, *n*, depending from the pressure-bar I, and whose outer extremity is pivoted to

the main link H, before described. The levers M N and links H and *n* are duplicated in each system, one set being attached to each side of the pressure-bar, clamping-block, and horizontal arm G, as shown in Fig. 2, and both pressure-bars are provided with the same operating mechanism.

The operation of the machine is as follows: The parts being in the position shown in the drawings, the stave or piece of wood K, suitably steamed or dampened, is placed upon the bending-strap *s* and held up against the former-block J by a foot-clamp consisting of a vertical bar, O, moving in guides upon the frame and through a perforation in the block L, and actuated by a foot-lever, P, below. As the crank-shaft C rotates and the cross-head F is drawn upward the pull of the links H through the levers N and M first causes the blocks *m* to move toward each other until stopped by the stave K, thus clamping it securely longitudinally. The effect of the pull is then felt by the pressure-bars I I, whose outer ends begin to rise; but as the pressure-bars change position the legs *i*, by which their forward ends are supported, also change their position and travel outward in their guideways *l l*, which are so formed that in the described movement of the legs *i* the inner ends of the pressure-bars move upward toward the former-block carrying the bending-strap and compress the stave closely against the curved surface of the block.

It will be observed that in the action of the levers the effect is distributed between moving the end clamps, *m*, forward, and the pressure-bars I upward and outward—an arrangement which prevents so great a pressure upon the end clamps as to upset the ends of the stave, yet maintains sufficient to prevent undue stretching of the outer fibers of the wood. In this operation the bending-strap *s* bends and follows up the stave K, which it hugs closely, and compresses it against the former-block, at the same time forming a support for the outer fibers, preventing slivering, while the pressure of the end clamps prevents the stretching and rupture of the fibers.

In the practical use of my improved machine the ordinary waste and loss experienced from breakage are entirely prevented, and a great economy in the actual result is thus effected.

The levers N and links *n* might be dispensed with, and the links H connected directly to the long arm of the levers M, which could be extended to obtain the necessary leverage; but the arrangement shown is preferable.

In bending staves the insertion and removal of a stave can be readily accomplished at each revolution of the crank $c^2$ without the necessity of skilled labor in so doing. The capacity of the machine is therefore only limited by its driving-speed and the convenient supply of material to the operator.

Having described my invention, I claim and desire to secure by Letters Patent—

1. In a wood-bending machine, in combination with its former-block, two pressure-bars, supporting and actuating a bending-strip, said bars being arranged normally in the same line beneath the former-block in suitable guides at their inner ends, and carrying clamping-blocks arranged to move horizontally upon the strap, and levers connected to the pressure-bars and clamping-blocks, and adapted, by the application of power, to clamp the ends of the material to be bent under a self-adjusting pressure, and by the upward movement of the pressure-bars to bend the material around the former-block, substantially as set forth.

2. The combination, in a wood-bending machine, of the former-block with the pressure-bars I, the arms supported in guides and arranged to support the inner ends of the presser-bars, the bending-strap *s* secured to the presser-bars, the levers M, pivoted to said bars and to the sliding clamping-blocks *m*, and to the levers N, that are pivoted at one end to links that are pivoted to the pressure-bars, and at their opposite ends pivoted to the links H, the said levers that are pivoted to the clamping-blocks being also pivoted to the levers which are pivoted to the links, all of said members being constructed and adapted for operation substantially as described.

3. The pressure-bars I, provided with end arms, *i*, and means for their upward movement, in combination with the block L, provided with guide-recesses *l*, or equivalent means of guiding the forward ends of the pressure-bars, substantially as set forth.

4. The combination, in a wood-bending machine, of the supporting-frame A with the former-block, the vertically-reciprocating cross-head F, the arm G, the links H, the pressure-bars I I, the bending-strap secured to said bars, and the arms *i* secured to the presser-bars, and supported at their lower ends in guides, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ADAM LUCKHAUPT.

Witnesses:
FRANK J. FISHER,
R. R. MARBLE.