

No. 621,713.

Patented Mar. 21, 1899.

G. M. ROBESON.  
PLOW HANDLE BENDING MACHINE.

(Application filed May 17, 1897.)

(No Model.)

2 Sheets—Sheet 1.

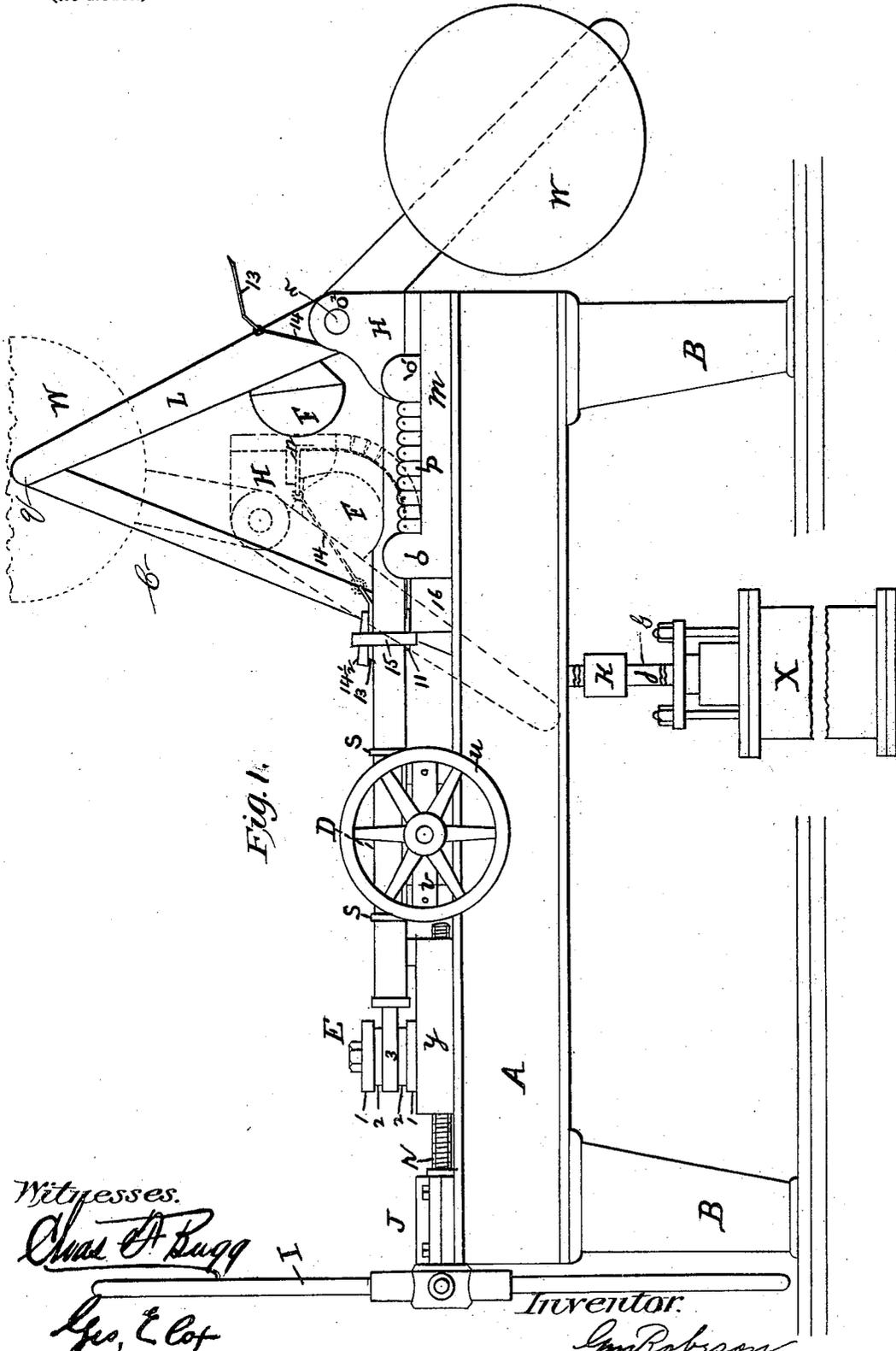


Fig. 1.

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Fig. 4.

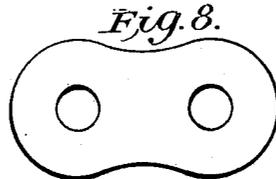
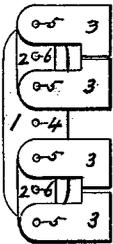


Fig. 6.

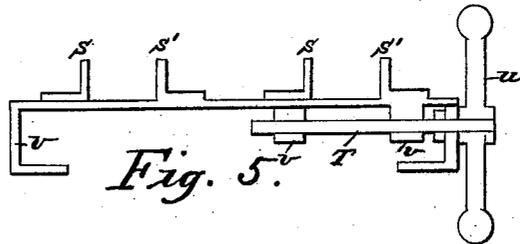
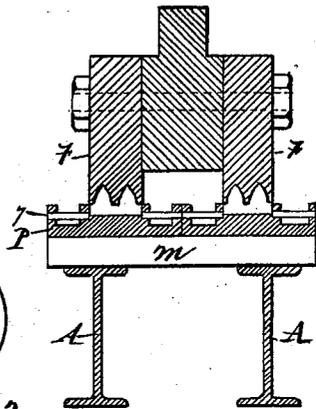
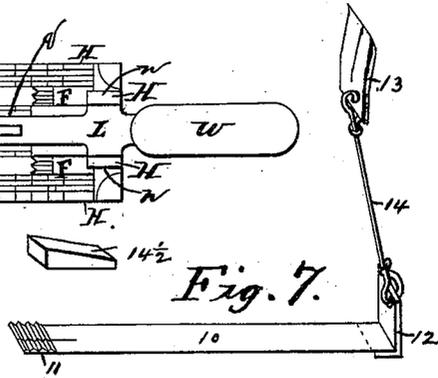
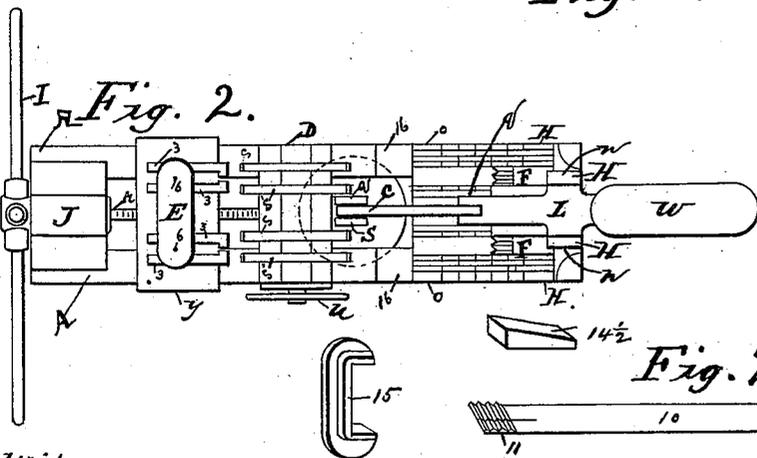


Fig. 2.



Witnesses.

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# UNITED STATES PATENT OFFICE.

GEORGE M. ROBESON, OF FARMVILLE, VIRGINIA.

## PLOW-HANDLE-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 621,713, dated March 21, 1899.

Application filed May 17, 1897. Serial No. 636,972. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE M. ROBESON, a citizen of the United States, residing at Farmville, in the county of Prince Edward and State of Virginia, have invented a new and useful Plow-Handle-Bending Machine, of which the following is a specification.

My invention relates to improvements in plow-handle-bending machines in which grooved forms operate in connection with a flexible bed, a pivoted lever, a vise, an equalizing-head, a steam-cylinder, a weight, a clamp, and a clamp-stop, all in connection with a suitable frame.

The object of my invention is to provide a plow-handle-bending machine to bend one or more plow-handles at one and the same time without the necessity of equalizing the plow-handles that can be operated continuously by hand or power and in which the clamp can be fastened after the handles are bent. I attain these objects by mechanism illustrated in the accompanying drawings and specification, in which—

Figure 1 is a side view of the entire machine. Fig. 2 is a top view of the entire machine. Fig. 3 is a sectional view through one of the bars forming the flexible bed. Fig. 4 is an enlarged view of the equalizing-levers. Fig. 5 is a side view of the vise in section. Fig. 6 is a sectional view of the machine through lines 1 2 3 4, Fig. 1. Fig. 7 is a perspective view of the clamp. Fig. 8 is a side view of one of the links of the flexible bed.

Similar letters and figures refer to similar parts throughout the several views.

The beams A and the lugs B B form the frame of the machine.

The bed-plate M is bolted to beams A and is provided at one end with lugs and pins O, to which the bars of the flexible bed P are connected by links. (Shown in Fig. 8.) The other end of the flexible bed is connected to a head-piece H, provided with lugs O' and pins to attach the links to, and also with another set of lugs O<sup>2</sup>, to which is connected, by a shaft N, the lever L. This lever is provided at one end with a heavy weight W, and at the other end is connected by a pin q to connecting-rod C. Connecting-rod C is attached by pin to a cross-head K, which is attached to the piston-rod G and slides on

guides j. The guides j are bolted to the under side of beams A and to the head of cylinder x. The cylinder x is provided with a piston and with valves operated by hand-lever, treadle, or both, or any other convenient means now in common use to control the flow of steam in the cylinder. Upon the lever L are mounted the grooved forms F, on which the plow-handles are bent. These forms are bolted to the lever and can be easily removed and replaced by others of different size or shape. Although I have drawn and described my machine with a flexible bed composed of bars and links, I do not confine myself to this construction, as it is quite obvious that a flexible strap could be used, with or without bars, or the bars might be strung on wire rope or on wire rods, or a flexible bed connected on the principle of the detachable-link chain in common use could be used to accomplish the same result. I prefer the plan shown in the drawings and described in the specification, which I think is the best form. At the other end of beams A is securely bolted a box J, in which runs a screw r, which in turn runs in a nut attached to the cross-head y, upon which is mounted the equalizer E, as shown enlarged at Fig. 4, in which 1 is the main lever or doubletree, 4 is a bolt upon which 1 can freely turn, and 2 2 are two short levers or singletrees connected to lever 1 by bolts 6 6, upon which they freely turn. To each end of levers 2 2 are pivoted, by bolts 5 5 5 5, the plungers 3 3 3 3, one plunger for each handle. This whole contrivance is mounted upon the sliding cross-head y, to which it is attached by bolt 4. The object of this equalizer is to obviate the necessity for having all the handles cut to an exact length.

Between the equalizing-head E and the bed-plate M a double vise D is securely bolted to the bed. This vise is provided with two sets of jaws s s, Fig. 5, a right-and-left screw T, and right and left nuts V V'. One nut is bolted to a bar which carries the jaws s s. The other nut is bolted to two bars which carry the jaws s' s'. These bars slide in grooves in frames v. The screw T is provided with a hand-wheel u. On turning the screw by the hand-wheel it is obvious that the jaws of the vise will be opened and closed simultaneously. The object of this vise is to pre-

vent the handles from springing during the bending operation.

The clamp, Fig. 7, is made of a steel band 10, (but may be made of any suitable material, as brass, copper, or iron,) serrated plates 11, knee-piece 12, rod 14, plate 13, wedge 14½, and clamp 15.

It will be observed that the end of the band 10 upon which serrated plates 11 are riveted is split for a short distance and also that plate 13 is split, as shown by the line in center. The object of this is to allow the clamp to engage each handle, although they may vary a little in thickness. After the handles are bent, the straps being on them, the plates 13 will be on one edge of the handles, exactly opposite serrated plates 11. The clamp 15 is then placed over the plates and fastened by wedge 14, one wedge and one clamp for each handle, the plate 13 resting on the handles, as shown in Fig. 1.

The stop 16 on frame for clamp 15 is so located and made as to hold clamp 15 from slipping while wedge is being driven. The stop is a simple block of metal or wood, or it may be made by extending the bed-plate M to the exact point where clamp 15 will come. (See Fig. 1.) Clamp 15 simply bears against stop 16 while wedge 14½ is being driven. The flexible bed P is composed of link-bars, a view of which is shown in Fig. 3. 7 7 represent pins, upon which are placed links, a diagram of which is shown at Fig. 8, to connect the link-bars to each other. Particular attention is called to the fact that the surface of the link-bars at 9, Fig. 3, is on a line with the center of pins 7 7 and forms the floor or bed which supports the handles during the act of bending and prevents them from breaking.

The head-piece H of the flexible bed is an essential feature of my invention. The shaft N, forming the pivot upon which lever L freely turns, is so located that the forms are raised entirely out of the flexible bed automatically by reversing the movement of the piston in the cylinder, thus allowing the handles to be removed from the grooved forms, and when the forms are drawn down in the first act of bending a heavy pressure is imposed upon the ends of the handles, clamping them securely in the head-piece. The lever L, with forms FF on each side, the power being applied at *g*, which is in the center, forms a perfectly-balanced head requiring no guides.

The power-cylinder or air-cylinder *x*, which is located under the frame of the machine, as shown in the drawings, is connected to the lever L by connecting-rod C and piston-rod G. It is obvious that as the piston, which is not shown, moves the piston-rod G and piston-rod G moves connecting-rod C, to which it is connected by pins, so will connecting-rod C, which is connected to lever L by pin *g*, move lever L, causing lever L to revolve about bolt N and bring forms F, which are at-

tached to lever L, in contact with handles that have been placed in the machine. As soon as forms F strike the handles the rotation of L about N ceases. Head-piece H and chain *p* are picked up and, with the handles, are bent or wound about F by the continued movement of the piston in cylinder *x* until the handles are fully bent, as shown in dotted lines, Fig. 1. After the clamps are fastened the reversal of the piston in the cylinder will force the bending-head back to its starting-point, at which place the handles can be removed. This same movement could be accomplished by the application of power through gearing of various sorts in common use; but I prefer the power-cylinder, although I do not limit myself to this construction. When the inner end of lever L is drawn down until form F comes into contact with the work, the curved surfaces of said forms become a rocking fulcrum for said lever. The motion on this fulcrum results in raising the pivot N and head-piece H and bending the flexible bed and the work between said head and said form. The resistance to be overcome in raising said pivot N is not only that of the work to be bent, but is increased by a weight W on the outer end of lever L. As the downward pressure of the fulcrum is necessarily increased as the resistance is increased, therefore the pressure exerted by the form constituting the fulcrum is increased by the added resistance of the weight, resulting in a greater and more steady or uniform pressure of the form and an improvement in the resultant bending of the wood. The weight also tends to return the parts to normal position.

To operate the machine, place two clamps in the flexible bed. Then place two pairs of handles, which have been previously prepared and steamed, in the machine, with the ends to be bent lying in the clamps, the central portion of the handles in the double vise D, one pair of handles in each pair of jaws and the other end of the handles resting against the plungers of the equalizer. The screw *r* is now turned by the spider I, forcing the equalizer against the handles and the handles in turn and their clamps against the head-piece H. The jaws of vise D are now closed against the sides of the handles, holding them firm and true in the center of the machine. Steam is now turned into the cylinder *x*. The lever L, with forms FF, is drawn down. As soon as the forms strike the handles the head-piece H will be lifted up from the solid bed-plate M and carry with it the rest of the flexible bed P, thus winding the handles around the forms, as illustrated in Fig. 1. The stroke of the piston is exactly equal to the stroke of the bending-head, so that the piston strikes the cylinder-head or suitable stops at each end of the stroke, and thus holds the handles in place until the

clamps are fastened. Vise D and equalizer E are then released. After the clamps are fastened to the handles and vise D and equalizer E are released the piston is reversed, rolling the bending-head back, handles and all, thus unwinding the flexible bed and returning all the parts of the bending-head to their initial position, with the bent handles on the forms, but clearing the flexible bed enough to allow the handles to be taken off without removing the clamps. The handles are now removed from the forms and the operation repeated continuously.

I am aware that the steam-cylinder is not a new invention, nor is it absolutely necessary to the practical working of my machine, as it is obviously practical to use a train of gears or hand-power applied direct to the lever, as I would do in building a machine to bend one handle at a time.

Having now described my machine, I claim as my invention—

1. The combination in a plow-handle-bending head of a solid bed-plate M, bolted to beams A, of a flexible bed P formed of a series of bars P pivotally connected by links R to each other and to solid bed-plate M of a head-piece H having two sets of lugs, by one set of which it is pivotally connected to and forms the free end of the flexible bed, of a lever L carrying forms, pivotally connected to head-piece H, by the other set of lugs, of a weight W, secured to one end of said lever, as set forth.

2. In the double vise D jaws *s, s*, connected to one nut V, and jaws *s' s'* connected to the other nut V', both nuts being fitted to one right-and-left screw T, all in combination with a plow-handle bender as shown and described.

3. In combination with the bending mechanism of a wood-bending machine the equalizing-head E, composed of a main lever, said lever being pivotally connected at its center to a sliding cross-head *γ* and at each end to two shorter levers, which latter levers are pivotally connected at their centers with the main lever and near their ends with plungers substantially as shown and described in the drawings and specification.

4. In a clamp for holding bent wood the flexible strap 10, split for a short distance at one end, with two serrated plates 11 riveted to split end of strap, the plate 13 pivotally connected to knee-piece 12 by rod 14, said knee-piece being riveted to the flexible strap all in combination as shown and described.

5. The power-cylinder *x* secured to beams

A by guides J and connected to the lever L of the bending-head by piston-rod G, pins S connecting-rod C and pin *q* in combination with the form and said bending-head and flexible bed substantially as shown and described.

6. The combination in a plow-handle-bending machine of a bending-head secured to one end of a suitable frame, of means for operating the bending-head, of a double vise connected to the frame near the center of its length, of an equalizing-head secured to the frame so it will slide longitudinally on the frame at the opposite end from the bending-head, means for sliding the equalizing-head, of a clamp for holding the handles in shape, and the stop 16 all substantially as set forth in the written specification and shown in the drawings.

7. In a wood-bending machine a series of bars P shown in section with space 9 for articles being bent to rest on and space 8 for connecting-links to occupy and pins 7 to pass through the links, the axis of the pins being located in the plane of the surface of space 9 so as to cause the article to be perfectly bent; as shown and described.

8. In a wood-bending machine, the head-piece H, pivotally connected to lever L by lugs O<sup>2</sup> and bolt N<sup>2</sup> and to flexible bed or strap P by lugs O' so located with regard to each other and to the forms F that on moving said lever said forms are brought in contact with the articles to be bent, and said articles bent by the continuation of the same movement, and upon the reversal of the movement, said forms and bent articles are thrown back and out of said head-piece and flexible bed or strap to a point from which said bent articles can be readily removed from said forms; the forms being then and there in proper position for the beginning of the next operation; as shown and described.

9. In a wood-bending machine, the weight W on the outer end of lever L in combination with said lever and the form F, located on the inner end thereof said lever being pivotally connected to flexible bed P by pivot N said form and weight being on opposite sides of said pivot thereby increasing the pressure of said form upon said flexible bed and the material being bent thereon as shown and described.

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Witnesses:

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