

E. W. STEWART.  
Metal-Bending Machine.

No. 220,503.

Patented Oct. 14, 1879.

Fig. 1.

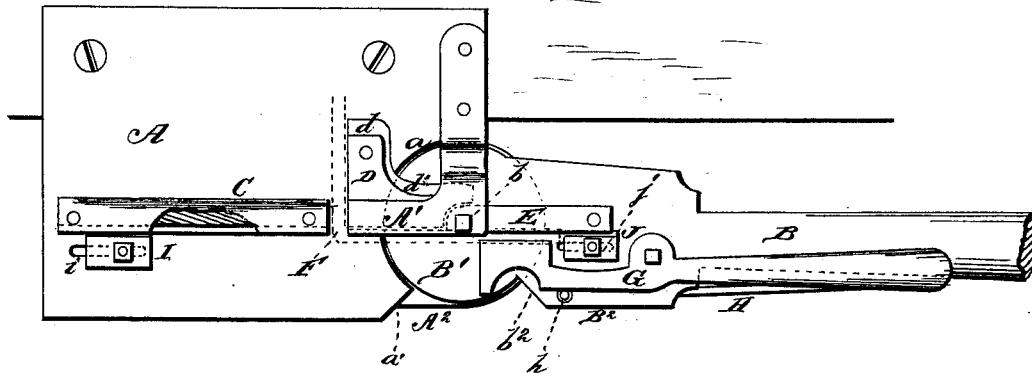


Fig. 2.

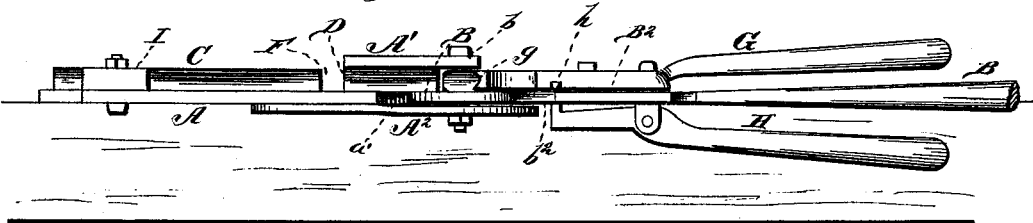
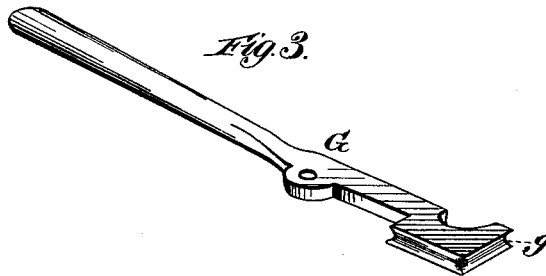


Fig. 3.



WITNESSES

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ENOS W. STEWART, OF KALAMAZOO, MICHIGAN, ASSIGNOR OF ONE-HALF  
OF HIS RIGHT TO JOHN H. ROLSON, OF SAME PLACE.

## IMPROVEMENT IN METAL-BENDING MACHINES.

Specification forming part of Letters Patent No. **220,503**, dated October 14, 1879; application filed  
May 9, 1879.

*To all whom it may concern:*

Be it known that I, ENOS W. STEWART, of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented certain new and useful Improvements in Metal-Bending Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which 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 letters of reference marked thereon, which form a part of this specification.

The object of this invention is to furnish a convenient machine for bending bars of metal into angular forms, and especially into the double-crank form usual in sulky-plow axles, without weakening said bars thereby. This object is attained by the construction, combination, and arrangement of devices hereinafter particularly set forth and claimed.

In the accompanying drawings, Figure 1 represents a top view of my metal-bending machine in horizontal position, ready to be secured to a bench or other support for use. Fig. 2 represents a front-edge view of the same; and Fig. 3 represents a detail view of the clamping-lever, showing the grooves on the terminal operating portion of the same.

A designates the bed-plate of my machine, which is secured to a work-bench or other convenient support in a horizontal position. This plate is semicircularly-recessed in its front right-hand corner at *a* to receive the circular head *B*<sup>1</sup> of bending-lever B, which has for its fulcrum pivot rod or bolt *b*. This pivot-bolt is arranged centrally with reference to circular lever-head *B*<sup>1</sup> and recess *a* of bed-plate A, and is attached to bearing-plates *A*<sup>1</sup> *A*<sup>2</sup>, which are secured, respectively, to the top and to the bottom of bed-plate A. The metal of said bed-plate surrounding recess *a* serves to guide head *B*<sup>1</sup> and brace pivot-bolt *b*. The front part, *B*<sup>2</sup>, of lever B is provided with a shoulder which has an inclined end, *b*<sup>2</sup>, and the proximate front part of bed-plate A has a similar incline, *a*<sup>1</sup>. These inclined parts *a*<sup>1</sup> *b*<sup>2</sup> engage with each other when lever B is turned at right angles with the front of plate A, and prevent said lever from turning beyond this

rectangular position. When attached to a work-bench for use all the working parts of the machine extend forward beyond the bench.

The top of bed-plate A is provided with longitudinal guide-bar C and angular guide-bar D, which are separated by a transverse passage or supplementary guideway, F. This guideway F is extended in the same transverse direction by means of the grooved outer side of the transverse arm *d* of angular guide-bar D. The longitudinal arm *d*<sup>1</sup> of said angular guide-bar and the guide-bar C are also similarly grooved on the outer faces. The form and size of the groove are such in each case that it will readily receive the metallic rod to be bent when said rod is laid along the face of the guide-bar. Longitudinal arm *d*<sup>1</sup> of angular guide-bar D extends under top bearing *A*<sup>1</sup> and braces lever B against vertical strain. Its outer end is recessed to allow the movement of the proximate rounded end of a third guide-bar, E, which is firmly attached to or formed on the upper face of bending-lever B. The front of this guide-bar E is longitudinally grooved in continuation of the groove in the front of guide-bars C D. When lever B is drawn forward the continuity of this guide-groove is not broken thereby, but its shape becomes more and more removed from a straight line, until at last it is a right angle.

It is obvious that if a straight bar of metal be clamped immovably to this guideway during the turning of lever B, said bar will be gradually bent into the shape of a right angle.

The devices which I employ to effect this clamping are a horizontally-operating clamping-lever, G, and a vertically-operating locking-lever, H. The former (shown in detail in Fig. 3) is pivoted on the top of lever B, and has a square terminal operating part, which is provided with a groove, *g*, similar to the guideway grooves already described, and running along both the end and the rear of said lever G.

Clamping-lever G is held tightly against the bar to be bent as the weight of the long end of locking-lever H forces upward the short end of said lever and causes the pin *h*, carried thereby, to pass up through a hole in lever B and behind clamping-lever G. By raising the long end of locking-lever H pin *h* is withdrawn and

clamping-lever G is set free. When said clamping-lever is turned to grasp a bar of metal it is not necessary to operate locking-lever H to get pin *h* out of the way, as the tip of said pin is beveled outwardly, so that the said clamping-lever coming in contact with the incline on the pin *h* automatically forces said pin back out of the way.

To prevent longitudinal extension of the bar to be bent and to more perfectly secure it, I employ stop-blocks I J, which extend into the main guideway at the ends thereof, and are longitudinally adjustable respectively in slot *i* of plate A and slot *j* of lever B by means of suitable clamping devices. This adjustability adapts the machine to use with bars of different lengths. When the bar is clamped to the guideway by the lever G, and bent as stated, it is evident that it will not be weakened in the bend; but, on the contrary, it will be strengthened, since the shortening of the guideway will force a greater amount of material into the same space, and longitudinal expansion will be prevented, while the tight fit of the clamping end of lever G will prevent any change of shape in the cross-section of the bar. The corner of the terminal part of lever G corresponds so exactly with the angle formed by the guideway when bent forward as far as possible, as before described, that a perfect right angle in the bent bar is thereby insured.

To make a second bend, as for a sulky-plow axle, one part of the bent bar is clamped in the main groove as before, the other part extending transversely through supplemental guide-

way F. The operation of bending is then repeated.

It is obvious that the clamping devices and other parts of the machine may be considerably changed without departing from the spirit and scope of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the bending-lever and clamping device, fixed guide-bars C D, movable guide-bar E, and supplemental transverse guideway F, substantially as and for the purpose set forth.

2. The combination of adjustable stop-blocks I J, slotted bed-plate A, and slotted lever B with guide-bars and clamping devices, substantially as set forth.

3. The combination, with fixed guide-bar D and bending-lever B, of clamping-lever G, locking-lever H, and beveled pin *h*, said pin being thrown upward by the weight of the long arm of lever H and automatically forced back by lever G during its closing movement.

4. In combination with bending-lever B, guide-bars C D E, and clamping-lever G, the end stop-blocks I J, arranged substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

ENOS W. STEWART.

Witnesses:

OSCAR TUTHELL,  
JOHN H. ROLSON.