

(No Model.)

W. B. MACK.
MACHINE FOR BENDING METALLIC PIPE.

No. 343,962.

Patented June 15, 1886.

Fig. 1.

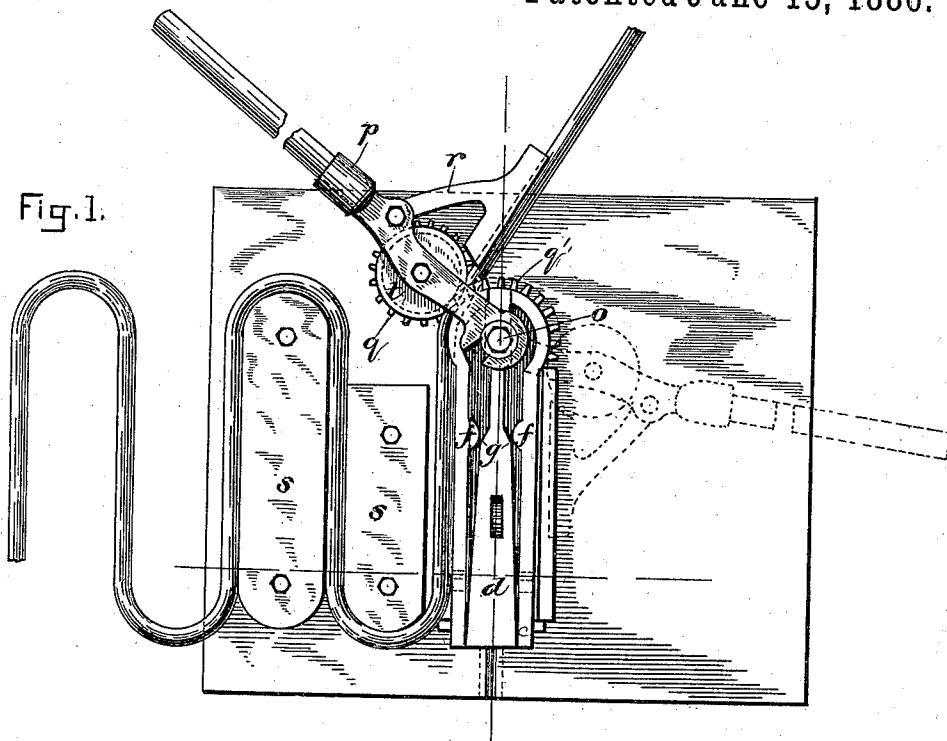


Fig. 2.

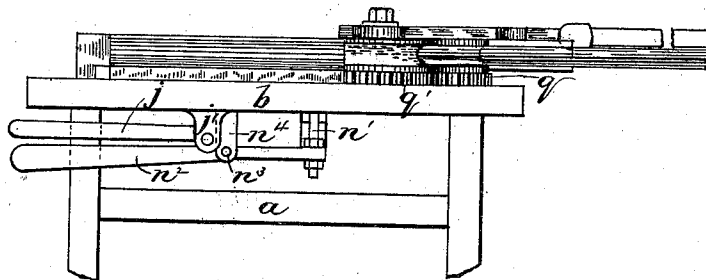


Fig. 3.

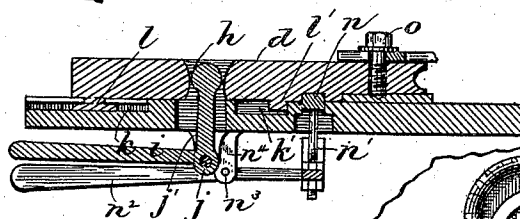


Fig. 4.

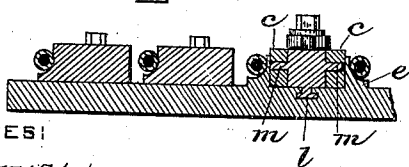
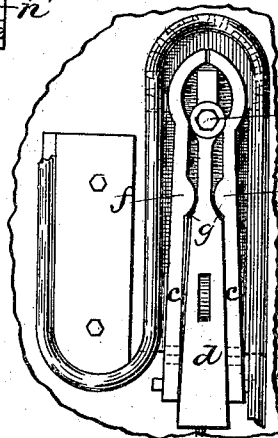


Fig. 5.



WITNESSES:

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INVENTOR:

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By *Wm. H. Crossley*

Att'y.

UNITED STATES PATENT OFFICE.

WILLIAM B. MACK, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF TWO-THIRDS
TO THE NATIONAL TUBE WORKS COMPANY, OF SAME PLACE.

MACHINE FOR BENDING METALLIC PIPE.

SPECIFICATION forming part of Letters Patent No. 343,962, dated June 15, 1886.

Application filed January 4, 1886. Serial No. 187,603. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. MACK, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Metal-Bending Machines, of which the following is a specification.

My invention relates to metal-bending machines, and more particularly to that class of contrivances designed to bend metal pipe into a serpentine form, or into regular reverse curves, or other similar shapes in which it is desirable, for any special purpose, that the bends should be uniform in character.

It is the object of my invention to construct a machine of the character mentioned which shall be at once simple in construction, compact in form, and be easily and effectively manipulated.

To the foregoing ends my invention consists in the machine and combinations of parts therein hereinafter described in connection with the drawings, and subsequently pointed out in the claims.

In the drawings forming a part of this specification, Figure 1 represents a top plan view of my invention with a section of metal pipe therein, showing how the latter is held while being bent, and how the bending is accomplished. Fig. 2 is a side view of the same. Fig. 3 is a sectional view on the line *xx* of Fig. 1. Fig. 4 is a sectional view on the line *yy* of Fig. 1. Fig. 5 is a detached view hereinafter referred to.

Similar letters of reference indicate similar parts in all the figures.

a represents a frame of any suitable construction, upon which is firmly mounted a table or bed, *b*, which supports and to which are affixed all of the parts constituting my invention.

On the top of bed *b*, at any convenient point, (in the present instance at about the center thereof,) I secure the former around which the pipe is bent. Said former is contractible and comprises the side bars or supports, *c c*, the center or spreading bar, *d*, and preferably, though not necessarily, the side rests, *E*, the latter being shown as formed integral with the bed, though they may be made separate therefrom and secured thereto in any suitable way. The forward ends of the side bars, or those

ends around which the pipe is bent, are curved in form, the curves extending inwardly or toward each other, the construction and arrangement being such as that when the forward end of the center bar, *d*, is brought between the forward ends of the side bars, the whole will form a little more than a half-circle at this point. The outer sides of the forward curved ends of the side bars and the forward end of the center bar have a rounded groove formed therein to correspond with the form of the pipe to be bent. The inner side of each side bar is provided with a cam lug or projection, *f*, adapted to be engaged by the cam or wedge-shaped faces *g*, formed on the sides of the center bar, *d*, as shown in Figs. 1 and 5. A slot, *h*, is formed in this center bar, and is adapted to secure one end of one arm of an elbow-lever, *i*, which extends up through a slot formed in the bed *b*. (See Fig. 3.) Said lever *i* is fulcrumed at its elbow *j* to lugs *j'*, attached to the lower side of the bed, or formed integral therewith. The free arm of elbow-lever *i* extends rearwardly to such a distance as to enable the operator to grasp and raise or lower it as occasion may require. By the construction just described it will be seen that by rocking elbow-lever *i* on its fulcrum center bar, *d*, will be moved to and fro longitudinally.

The bed is provided with grooves *k k'* on its upper surface, in which grooves studs or lugs *l l'*, formed on the under side of the center bar, *d*, are fitted to slide, and by which the movement of said bar *d* is guided, groove *k* and lug *l*, serving also to limit the longitudinal movements of said bar. Pins *m m* are formed on or secured to the sides of the center bar, which pins fit into slots formed through the side bars, *c*, and have a limited movement in said slots, as shown by dotted lines in Figs. 1 and 5, the construction providing for a limited movement of the center bar independent of the side bars. A recess, *n*, is formed in the under side of center bar, *d*, which recess is adapted to receive the upper end of a pin, *n'*, extending through a slot in the bed, and secured at its lower end to the forward end of a locking-lever, *n²*, fulcrumed at *n³* to lugs or ears *n⁴*, secured to the under side of the bed. The free end of lever *n²* extends rearwardly to enable it to be manipulated by the operator, and is so weighted as to hold the upper end of pin *n'*

in recess *n*, when the position of center bar, *d*, will permit of this being done, and so lock said bar in its forward position. A stud, *o*, is formed on or secured to the upper side of center bar, *d*, near its forward end, which stud 5 forms a fulcrum for removable lever *p*, provided with a peripherally-grooved wheel, *t*, adapted to move in a plane and circle coincident with the semicircle formed by the forward ends of the side and center bars, as represented in Figs. 1 and 2. Directly underneath said peripherally-grooved wheel *t*, and formed integral therewith, is a gear-wheel, *g*, adapted to engage a toothed segment, *g'*, formed on or 10 secured to the bed underneath bars *c* and *d*, and concentric with the semicircle formed by the forward ends of said bars when in their most forward position, as shown in Fig. 1. Said lever *p* is also provided with a shoe, *r*, 15 extending in front of peripherally-grooved wheel *t*, and having its face also grooved to fit the form of pipe to be bent. Blocks or plates *s*, formed to fit the loops or curves of the bent pipe, are secured to the bed, which support 25 and hold in position the bent portion of the pipe during the operation of further bending it.

The operation of my invention may be explained as follows: Presuming that it is designed to bend a metal pipe into reverse 30 curves, as represented in the drawings, one end of said pipe is placed between the side rests, *e*, its adjacent block or plate *s*, and extending between the forward curved end of side bar *c* and the peripherally-grooved wheel *t*, when the lever carrying said wheel is in a position as far to the left, as viewed in Fig. 1, as it can be moved, in which position of the parts the pipe will be straight between the various devices mentioned, the shoe *r* resting 40 thereagainst. The operator now takes hold of lever *p*, and drawing it around to the right, as shown by dotted lines in Fig. 1, shoe *r*, bearing and sliding on the pipe, bends it on a curve concentric with its movement, and peripherally-grooved wheel *t*, rolling in contact with the periphery of the semicircle formed by the forward ends of side bars, *c*, and center bar, *d*, gradually but effectively bends the pipe into 45 a form corresponding with this form of the forward ends of said side and center bars and the circle described by the periphery of grooved wheel *t*. Gear-wheel *g*, to which grooved wheel *t* is secured, or of which it may be made an integral part, gearing with toothed segment 50 *g'*, insures a positive rotation of said latter wheel and obviates friction in connection with the pipe. Lever *p* having been drawn over to the dotted-line position represented in Fig. 1, the pipe will have been bent into a semicircle around the forward ends of bars *c* and *d*, the main portions of said pipes lying parallel to each other. If, now, it is desired to bend the pipe into reverse curves, lever *p* is removed from the machine, which the hooked 65 character of its fulcrum end, as shown, permits of being done when the free end of lock-

ing-lever *n*² is raised, by which operation pin *n'* is withdrawn from recess *n*, after which the free end of elbow-lever *i* is lowered, which first withdraws the forward end of center bar 70 from between the forward curved ends of side bars, *c*, when the pins *m*, coming against the rear ends of the slot formed in the side bars, carry said side bars also rearwardly to the position represented in Fig. 5, and leaving the 75 bent pipe lying on the side rests, *e*, free to be turned over, so that the main body of the pipe will lie between side bar, *c*, and its adjacent block or plate *s*, with the bend around the rearward end of said plate or block and the 80 short straight end between the two blocks *s*. It being desired to give the pipe a reverse bend or curve, the free end of the elbow-lever *i* is raised, by which means center bar, *d*, will be moved forward, its cam-face *g* engaging 85 the cam-lugs *f* of the side bars and separating their forward ends, permitting the forward end of center bar, *d*, to enter therebetween. Simultaneously with this movement side bars *c* are moved forward by pins *m* coming into 90 contact with the forward ends of the slots in said bars, whereby the latter are brought into the position represented in Fig. 1, lock-pin *n'* snapping into recess *n* in the bed-plate by means of the weighted nature of the free end 95 of lever *n*², thus locking the parts into the position represented in Fig. 1, when the operation before described may be repeated, and so on until the pipe is given the required number of bends or curves. 100

It will be readily understood that the loops in the pipe may be varied in length as the points at which the bends are made are varied, the length and character of blocks *s* being made to correspond thereto, and the bend may 105 be at such short intervals as to form the pipe into a perfect serpentine shape.

The form and construction of my machine may be varied to a degree within the scope of mechanical ingenuity without departing from 110 the spirit of the invention.

What I claim is—

1. A metal-bending machine comprising a bed and support therefor, a contractible former mounted on said bed, mechanism for moving 115 said former into and locking it in operative or expanded position, mechanism for moving it into its contracted or inoperative position, and devices for bending the metal around said former, all substantially as hereinbefore set 120 forth.

2. A contractible former for metal-bending machines, consisting of two side bars having their forward ends curved and grooved, substantially as described, the center bar having 125 its forward end correspondingly grooved and adapted to be placed in position between the forward ends of the side bars, and mechanism for moving said center bar into its operative or expanded and inoperative or contracted 130 positions, substantially as hereinbefore set forth.

3. The combination, with the contractible former consisting of the two side bars and center bar, and mechanism for moving said former into its operative or expanded and inoperative or contracted positions, of the removable lever *p*, provided with the peripherally-grooved wheel and shoe, as set forth.

4. The combination, with the bed, of the contractible former, the toothed segment *q'*, and the removable lever provided with the peripherally-grooved wheel, the shoe, and gear-wheel *q*, as set forth.

5. The combination, with the bed, of the contractible former and the removable lever, provided with devices, substantially as described, for bending metal around said former, as set forth.

6. The combination, with the bed, of the contractible former, the removable lever *p*, provided with devices, substantially as described, for bending metal around said former, and the blocks or plates *s*, as set forth.

7. The combination, with the bed, of the side bars, *c*, provided with the cam-lugs *f*, the center bar, *d*, having the cam-faces *g*, devices, substantially as described, whereby said cen-

ter bar may be moved to a limited extent independent of the side bars, and mechanism for moving the center and side bars, as set forth.

8. The combination, with the slotted bed, of the side bars, *c*, provided with the cam-lugs *f*, the center bar, *d*, provided with the cam-faces *g*, and having the slot *h*, devices, substantially as described, whereby said center bar may be moved to a limited extent independent of the side bars, and the elbow-lever *i*, for moving the center and side bars, as set forth.

9. The combination, with the contractible former, mechanism, substantially as described, for moving said former into its operative or expanded and inoperative or contracted positions, and devices for locking the former in its expanded or operative position, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 1st day of January, 1886.

WILLIAM B. MACK.

Witnesses:

C. F. BROWN,

ARTHUR W. CROSSLEY.