(Model.)

# J. CLARK.

## SHEET METAL BENDING MACHINE.

No. 480,396. Patented Aug. 9, 1892.

Fig. 1.

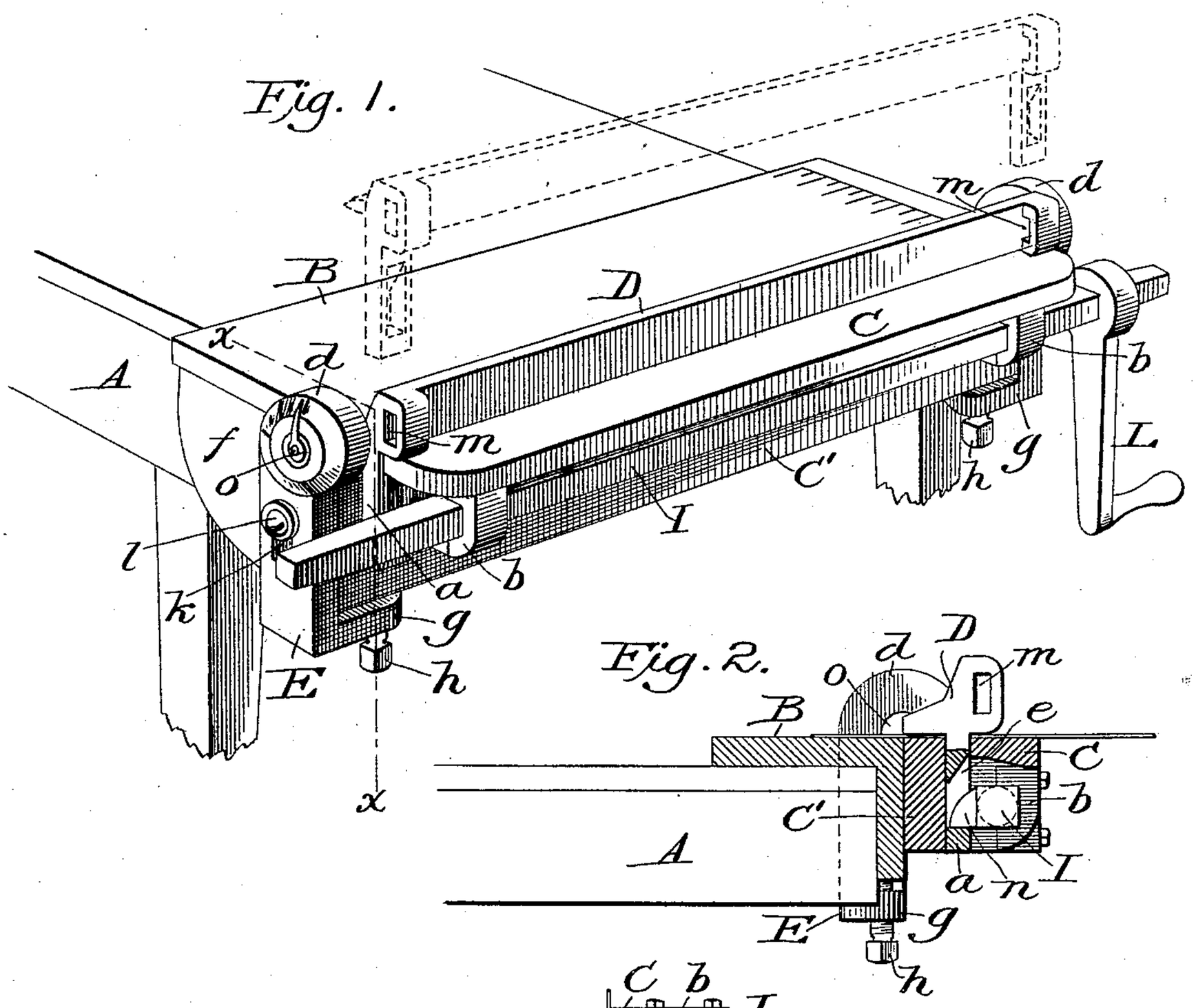



Fig. 2.




Fig. 3.

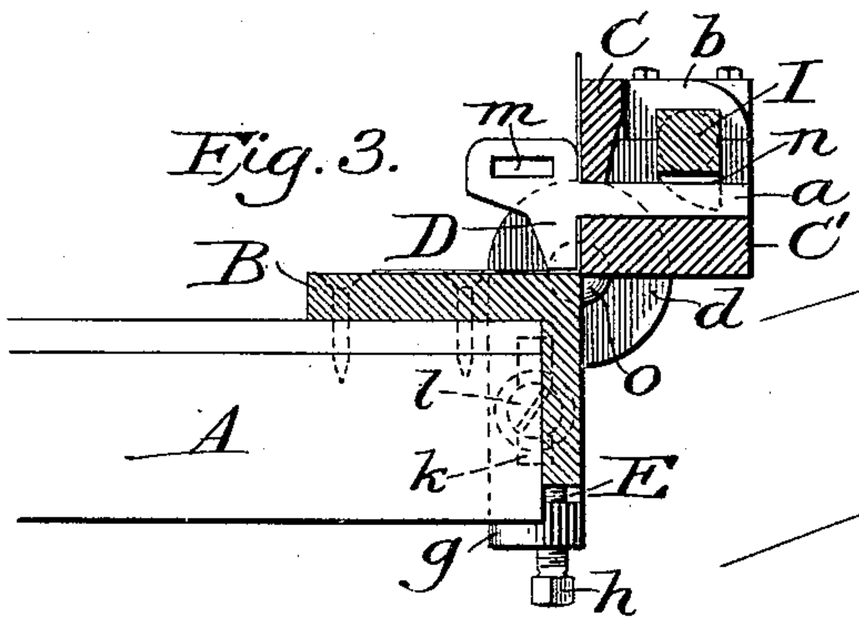



Fig. 4.

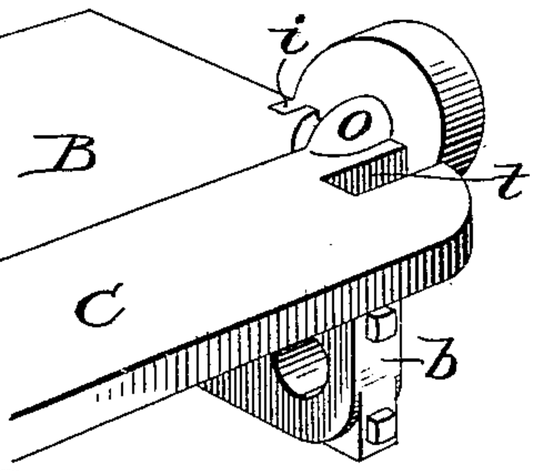
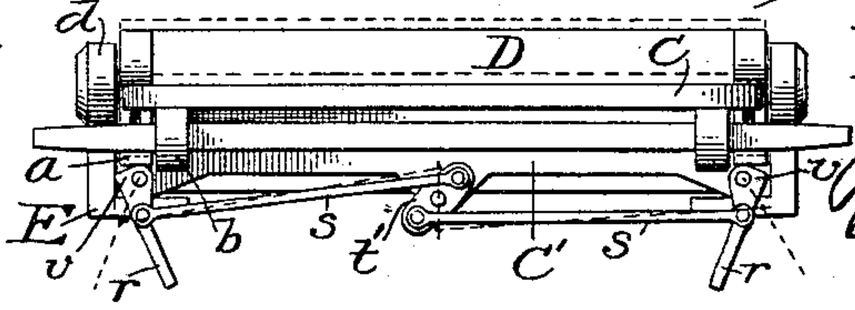



Fig. 5.

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# UNITED STATES PATENT OFFICE.

JASPER CLARK, OF ELMIRA, NEW YORK, ASSIGNOR TO T. C. NORTHCOTT AND CYNTHIA J. CLARK, OF SAME PLACE.

## SHEET-METAL-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 480,396, dated August 9, 1892.

Application filed April 2, 1892. Serial No. 427,497. (Model.)

*To all whom it may concern:*

Be it known that I, JASPER CLARK, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Machines for Bending Sheet Metal, of which the following is a specification.

This invention relates to machines used for bending sheet metal; and the invention consists in the novel construction and combination of parts constituting the machine, as hereinafter more fully set forth.

Figure 1 is a perspective view of the machine. Fig. 2 is a vertical section on the line *x x* of Fig. 1. Fig. 3 is a similar view with the brake-bar removed. Fig. 4 is a perspective view of one corner of the machine, and Fig. 5 a front face view showing the cams for raising the brake-bar.

This invention belongs to that class of machines which are used for bending large sheets of metal for forming tubes, cornices, gutters, and the like, the object being to produce a machine capable of bending thick or heavy sheets of iron, steel, or other sheet metal and that will perform the work with accuracy and rapidity.

In the drawings, A represents a table or frame, to which the machine is secured and which serves as a support for the same.

The machine consists of a solid-metal bed-plate B and a movable plate C, which is journaled at its ends to adjustable bearings *d*, secured at the ends of the bed-plate, this movable plate C supporting a detachable brake-bar D, which also operates to clamp and hold the sheet of metal while being bent, the brake-bar D being made to clamp the sheet of metal by means of a shaft I, which is journaled to the movable plate and to which shaft the operating-lever is applied.

The detailed construction is substantially as follows: The bed-plate B is a strong flat plate with a vertical flange at its front edge, as shown in Figs. 2 and 3, with a corner-piece *f* at each end to strengthen and unite the parts. The movable plate is in like manner made with two wings C and C′, standing at right angles to each other, as is also shown in Figs. 2 and 3, and in the angle between these wings are two boxes or bearings *b*, in which a shaft I is journaled, the squared ends of this shaft projecting at each end for the reception of the operating crank or lever L, which is made detachable, all as shown in Fig. 1. This movable plate, which is termed the "brake-plate," is provided at each end with a journal *o*, which, as shown in Fig. 4, is offset one-half of its diameter, so that when mounted in its bearings *d* the inner edge of this brake-plate will be in alignment with the adjoining edge of the bed-plate at all times, whether resting flat, as shown in Fig. 2, or turned up as shown in Fig. 3. The bearings *d* consist of a strong circular head having a hole at the center for the journals *o*, the part *d* having a depending arm E, as shown clearly in Fig. 1, the lower end of this arm terminating with a projection *g* for the reception of a set-screw *h*, the upper end of which bears against the lower edge of the vertical flange of the bed-plate, as shown in Figs. 1, 2, and 3. Each of these arms E is provided with a slot *k*, through which is inserted a bolt *l*, that fits into a hole in the bracket or end plate *f*, as shown in Fig. 1, and on the inner face of the arm E is a flange or projection *i*, which fits in a corresponding groove cut in the end of the bed-plate B, as shown in Fig. 4. By these means the brake-plate C, with its bearings *d*, are securely fastened to the bed-plate and yet can be adjusted vertically in relation to the bed-plate to any extent that may be desired. It is obvious that, instead of the rib or projection *i* and its groove in the bed-plate, ribs or guides may be formed on the face of the end pieces or brackets *f* to hold and guide the arms E, it being merely a matter of choice as to the special mechanical means that shall be used for this purpose, it, however, being necessary that the bearing *d* be held secure, so as to hold the edge of the brake-plate against any yielding movement away from the edge of the bed-plate when turned up to bend a sheet of metal, more especially as this machine is designed for bending the heavier grades of sheet metal. Upon this brake-plate C is placed a brake-bar D, as shown in Figs. 1, 2, and 3. This is a strong rigid bar, an end view of which is clearly shown in Figs. 2 and 3. It is as long as the brake-plate and at each end is provided

with a depending arm or projection *a*, which fits loosely in corresponding slots *t* in the ends of the plate C, as shown, so that the bar D can be raised to permit the sheet of metal to be shoved in under it on the plate C, as shown in Fig. 2, and so that it can be detached therefrom when desired. In each of these arms *a* there is a slot *e*, as shown in Fig. 2 and by the dotted lines in Fig. 1, and which show the brake-bar detached, and on the shaft I, opposite each arm *a*, there is strong tooth or projection *n*, (shown in Fig. 2,) so arranged that when the crank or lever L is moved to raise or turn the brake-plate these lugs or teeth *n* will engage in the slots *e* of the arms *a*, and thus draw the brake-bar D down upon the sheet of metal and clamp it fast upon the plate C, this clamping of the sheet thus being effected before the plate C begins its movement.

The slots *e* are made of such a length that by reversing the movement of the shaft I the lugs or teeth *n* will be thrown out of the slots, thus disconnecting the shaft entirely from the brake-bar, which can then be lifted from the brake-plate, as represented by the dotted lines in Fig. 1, the brake-bar D being provided at each end with sockets *m* for the insertion of short detachable bars or handles for that purpose. It will be readily seen that whenever the brake-plate is turned back to the horizontal position the pull of the shaft I on the brake-bar D will be released, thus loosening its hold on the sheet of metal, which can then be shoved forward for another bend or drawn out, as occasion may require.

It is obvious that instead of the lugs and slots for drawing down the brake-bar segmental pinions may be used on the shaft with corresponding teeth on the arms *a;* but the plan shown is simpler, cheaper, and stronger and is therefore preferred.

The object of making the brake-bar detachable is to enable it to be drawn endwise out of tubes after they have been bent or formed upon the machine, more especially when made of steel or heavy sheet metal, as is now frequently done to form large ducts for air, for heating and ventilating, and for many other purposes. The tubes when thus completely formed or bent have the edges brought together, and if made of heavy or stiff sheets it is difficult to open them sufficiently to draw it off from a stationary bar, and besides the opening of the tube sufficiently for this purpose springs the edges apart, requiring considerable time and labor to bring them together again, and is apt to leave the tube more or less misshapen or out of true, whereas by this plan the tube is left in perfect form, besides saving much time and labor.

These machines are designed to be of such a size as to take in and bend the widest sheets made and sufficiently heavy and rigid to bend any kind of sheet metal up to No. 12 sheet-steel, or even thicker sheets, though of course smaller and lighter machines may be made on the same plan for bending lighter metal.

In order to enable the brake-bar D to be raised from the sheet of metal to release the latter and permit it to be moved along for another bend, I pivot to the front face of the bed-plate two short levers or handles *r*, as shown in Fig. 5, they being located directly under the depending arms *a* of the brake-bar D. These levers *r* are each made with a shoulder or eccentric *v*, which when the lever is swung outward to the position indicated by the dotted lines in Fig. 5 will strike against the lower ends of the arms *a*, and thus raise the brake-bar, as indicated by the dotted lines. Each of these levers *r* is connected by a rod *s* to a short lever *t'*, pivoted at its center to the bed centrally between the levers, one rod being pivoted to its upper end and the other to its lower end, as clearly shown in Fig. 5, so that when one of these levers is moved it will move the other one also and to the same extent. By these means an operator at either side of the machine can raise the brake-bar, and as both ends are raised uniformly the arms *a* are prevented from binding in their slots, as they would if one end only were raised. This is the more important in large machines, in which the brake-bar is necessarily heavy, more especially when the bar is of considerable length, as it must be to bend wide sheets, it being necessary that it shall be strong and rigid.

The manner of using the machine will be readily understood. All that is necessary is to insert the sheet between the bar D and the plate C, shove its edge through upon the bed-plate B as far as is required for the first bend, as shown in Fig. 2, and then by means of the handles or levers L turn the brake-plate C up to the position shown in Fig. 3 in case it be desired to make a right-angled bend, or half-way if it be desired to make a bend at an angle of forty-five degrees, and so on, more or less, according to the angle at which it is desired to make the bend. The bed or frame will be provided either with a series of marks numbered, consecutively, as inches and fractions of an inch or with adjustable stops or gages, as preferred, to limit the distance the sheet is to be shoved through beyond the edge of the brake-bar, and thus enable the sheet to be quickly and truly adjusted to make the bends at such points on the sheet as may be desired. A series of such guide-marks is shown on Fig. 1.

For the purpose of guiding the operator in bending the metal at the various angles desired the circular bearing *d* is provided with a series of marks indicating the angle from zero to ninety degrees, and a pointer or index is attached to the extremity of the journal *o*, so that as the brake-plate is tipped this pointer as it it moves with the brake-plate will indicate when or at what point to stop in order to bend the sheet at any desired or predetermined angle, as shown in Fig. 1.

By the use of the machine thus constructed

large sheet-metal tubes of almost every form in cross-section can be made either rectangular or polygonal, or, in fact, nearly round, by making a succession of slight bends at frequent intervals. So, too, it is adapted for making sheet-metal cornice and similar articles.

By using sheets of metal of great width tubes, troughs, ducts, &c., can be made in sections equal in length to the width of the sheets or even longer by inserting the sheets sidewise, they first being cut into lengths equal to the full width of the machine and the sections be formed with such uniformity as to fit together with accuracy, thus making tubes or ducts of any desired length that will be true throughout and have a neat appearance.

Having thus described my invention, what I claim is—

1. In combination with the pivoted brake-plate C, having the shaft I mounted in bearings secured to or formed thereon, the detachable brake-bar D, mounted on said plate and provided with pendants or arms *a*, arranged to engage with projections on the shaft I when the latter is turned to swing the brake-plate, whereby the brake-bar is caused to automatically clamp the sheet of metal fast on the brake-plate before the latter begins its movement, substantially as set forth.

2. In combination with the stationary bed-plate B, the swinging or pivoted brake-plate C, with the brake-bar D held normally rigid when in use, but detachably connected to said brake-plate, substantially as described, whereby when the sheet has been bent into the form of a tube the brake-bar can be lifted from its seat and withdrawn from the tube, as set forth.

3. In combination with the movable brake-bar provided with the depending arms *a*, the levers *r*, provided with eccentrics arranged to bear against said arms and thereby raise the bar, the arrangement being substantially as shown and described.

4. In a machine for bending sheet metal, comprising a stationary bed and a pivoted brake-plate, and a pointer or index *o*, secured to the journal of the brake-plate and arranged to move therewith, in combination with the circular head or bearing *d*, provided with marks to indicate the various points at which the brake-plate is to be stopped in order to bend the sheet at a predetermined angle or angles, as set forth.

In witness whereof I hereunto set my hand in the presence of two witnesses.

JASPER CLARK.

Witnesses:
T. C. NORTHCOTT,
L. D. SHOEMAKER.