(No Model.) 3 Sheets—Sheet 1.

W. H. LOOP.

SHEET METAL BENDING MACHINE.

No. 413,451. Patented Oct. 22, 1889.

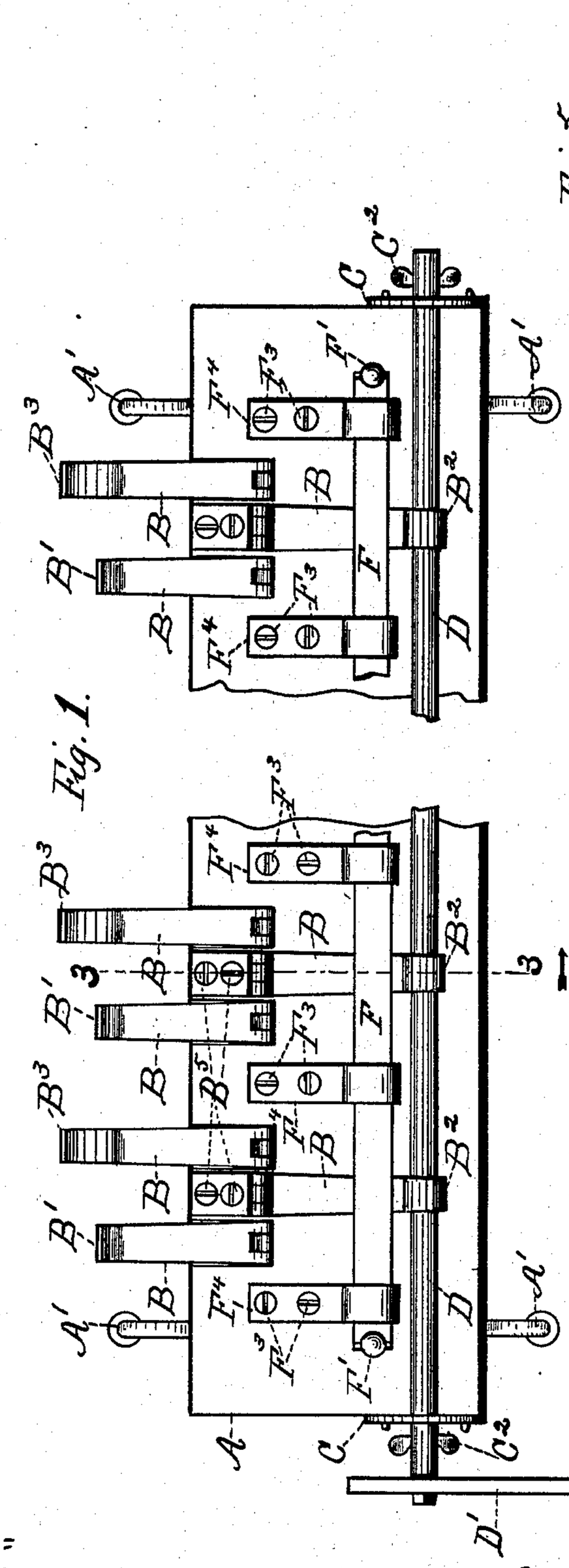

Fig. 1.

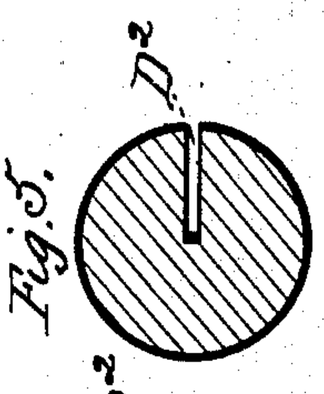

Fig. 5.

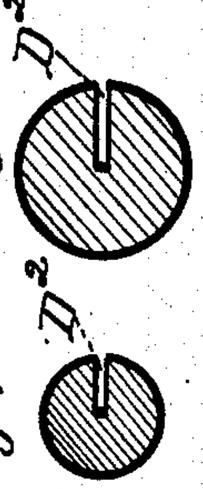

Fig. 6.

Fig. 7.

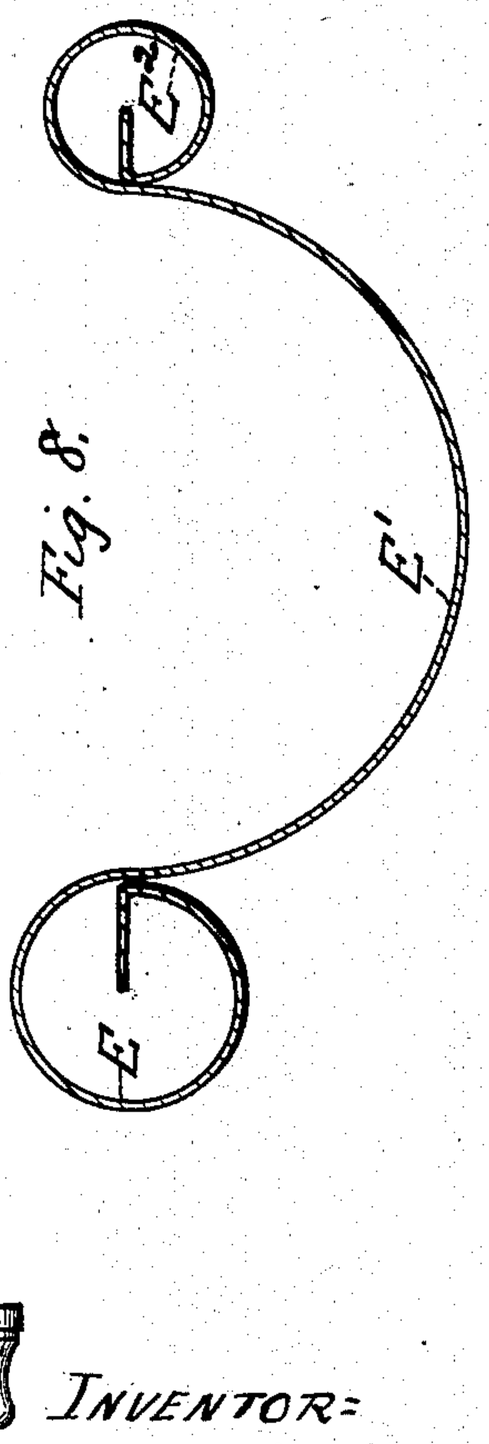

Fig. 8.

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INVENTOR:
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(No Model.) 3 Sheets—Sheet 2.

W. H. LOOP.

SHEET METAL BENDING MACHINE.

No. 413,451. Patented Oct. 22, 1889.

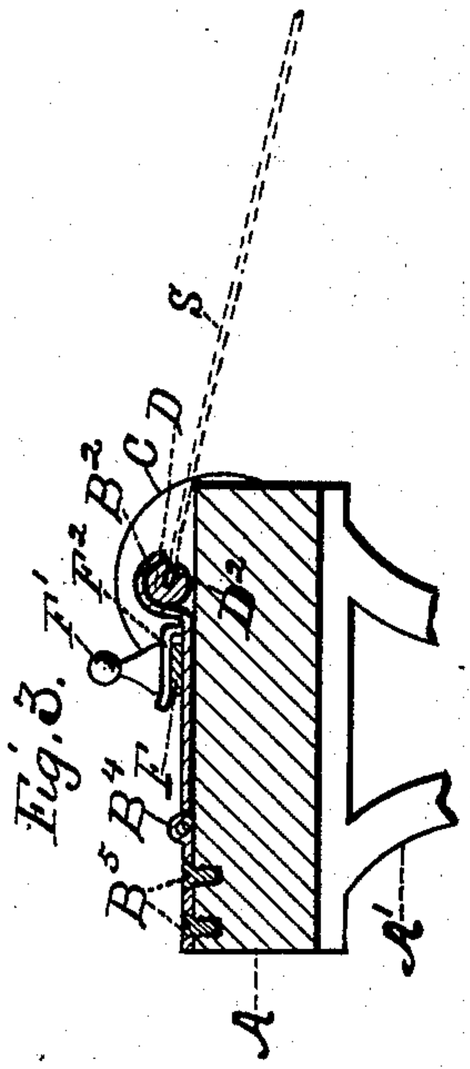

Fig. 3.

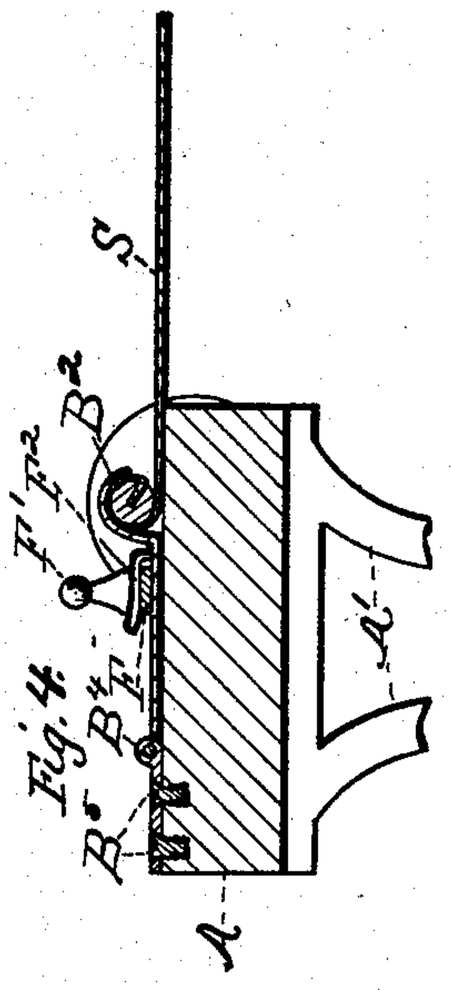

Fig. 4.

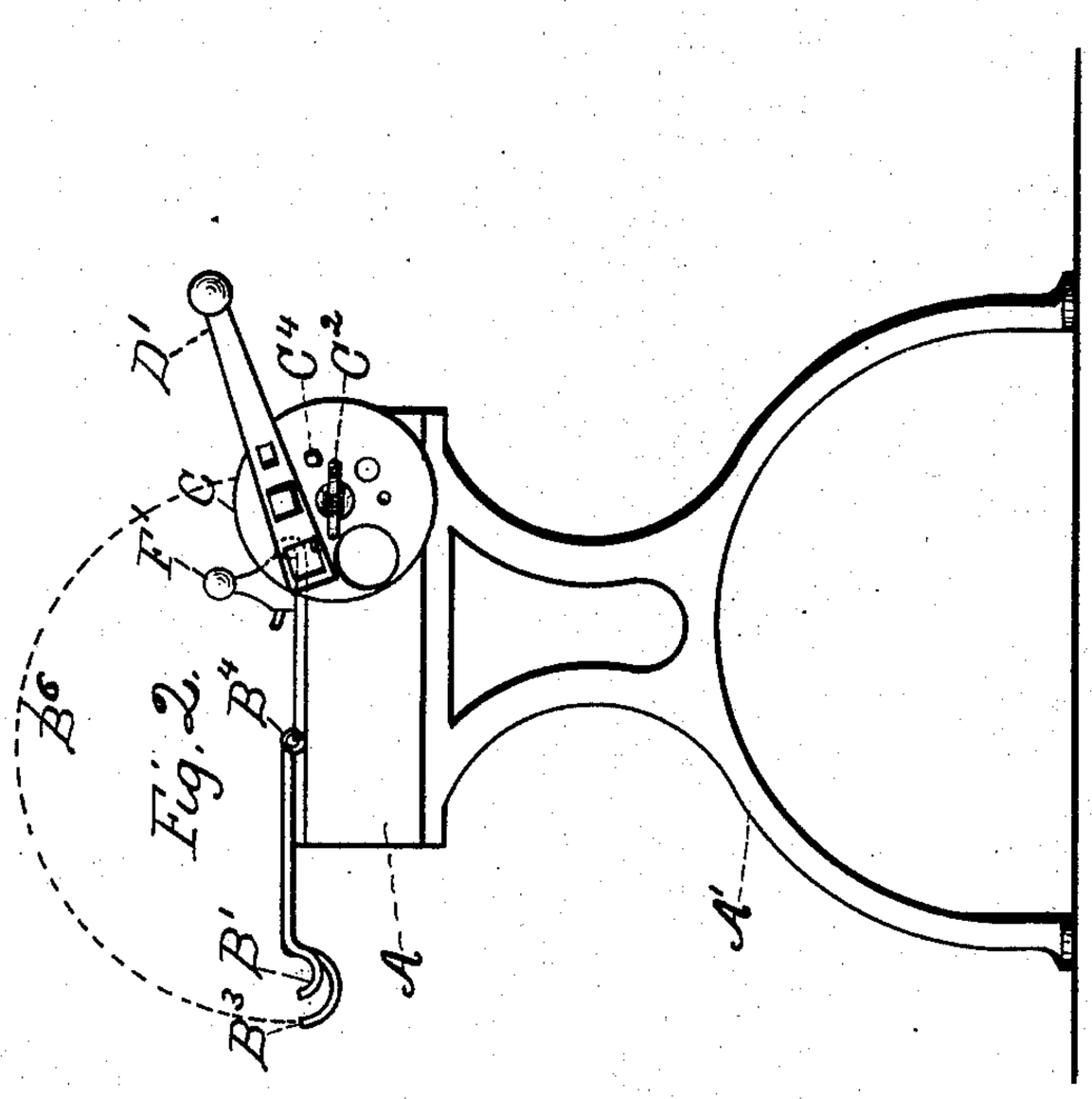

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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SHEET METAL BENDING MACHINE.

No. 413,451. Patented Oct. 22, 1889.

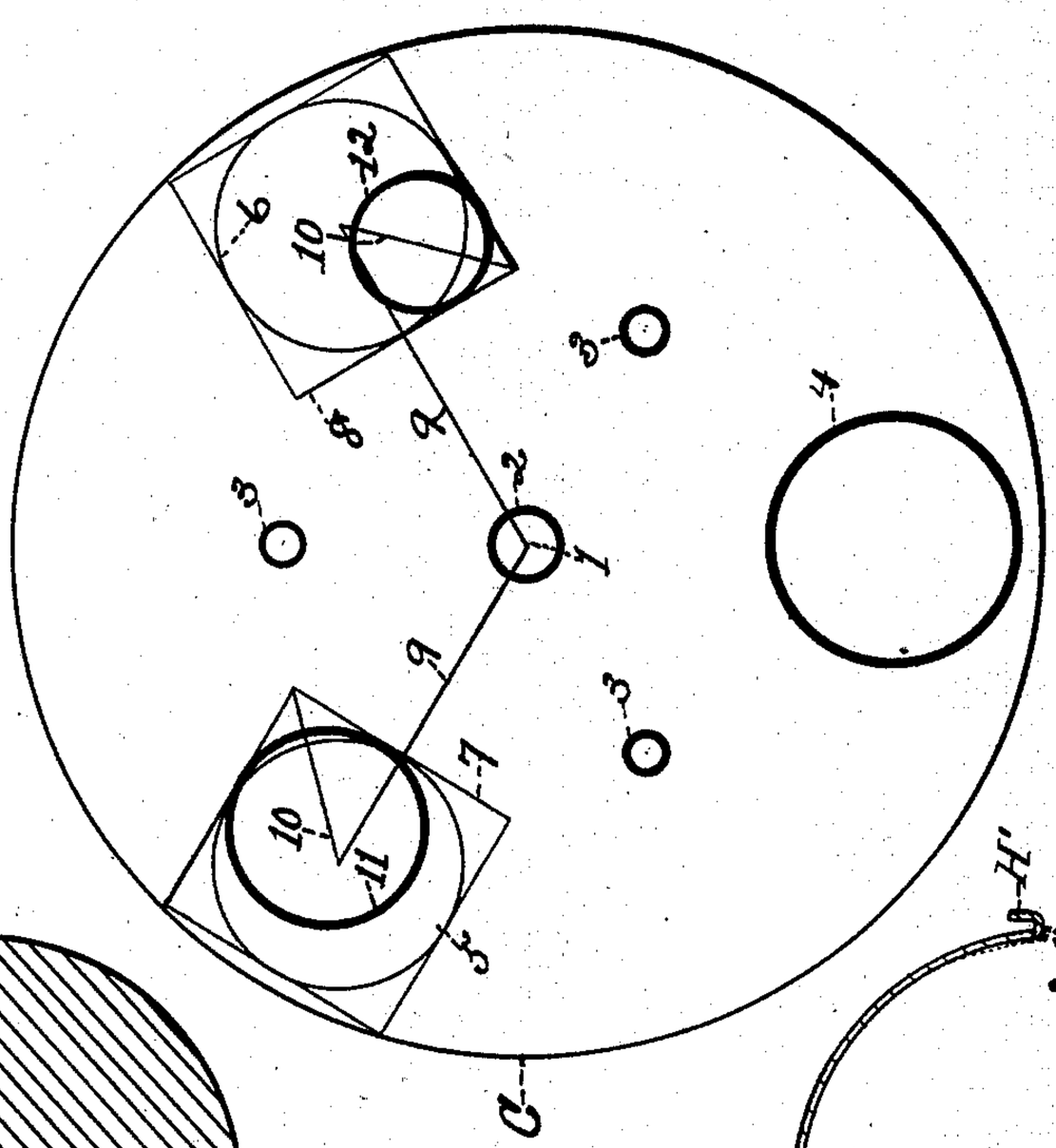

Fig. 10.

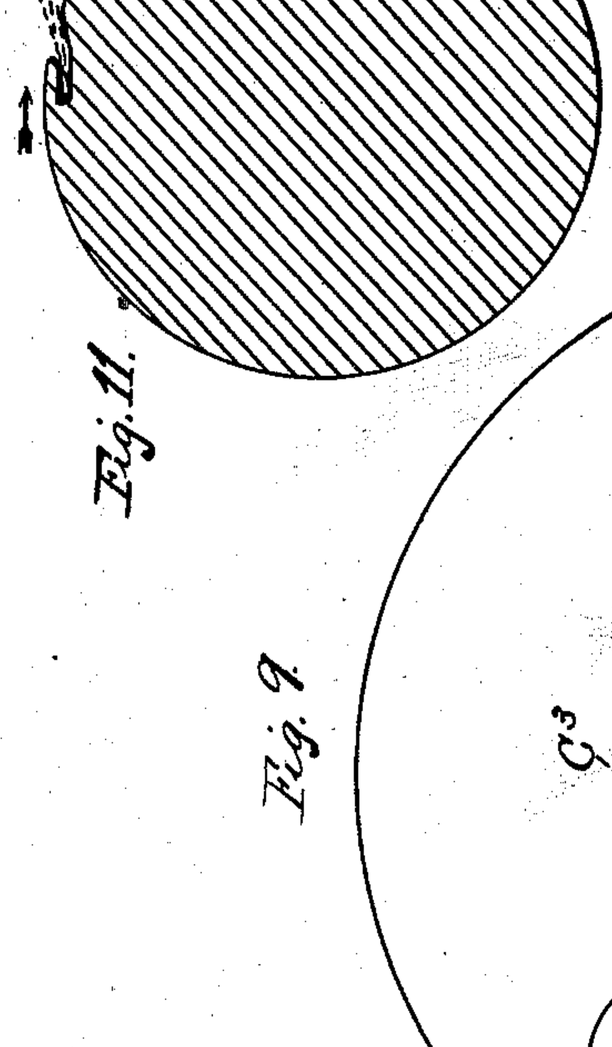

Fig. 11.

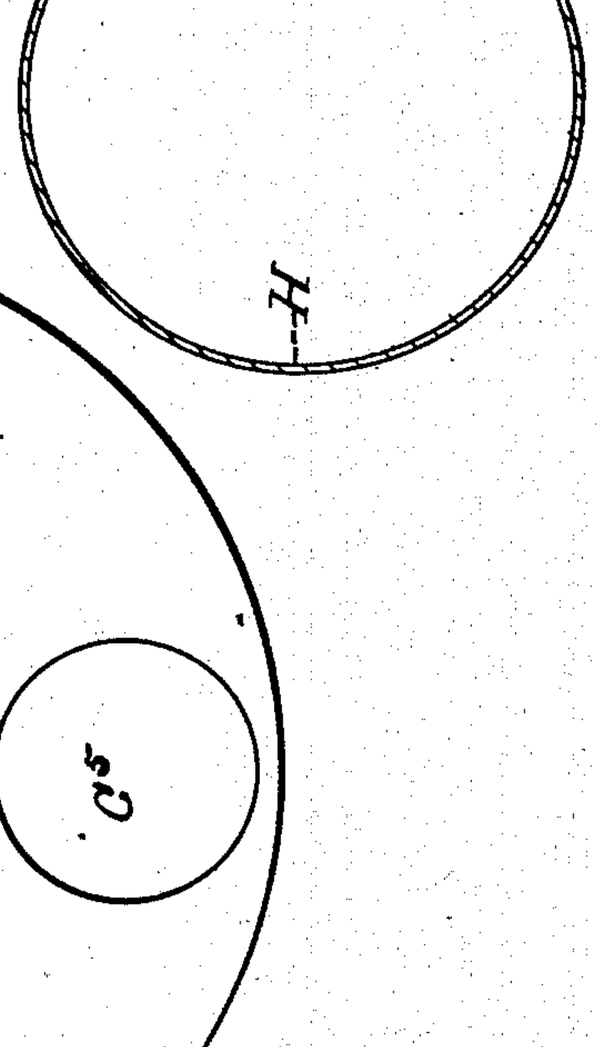

Fig. 12.

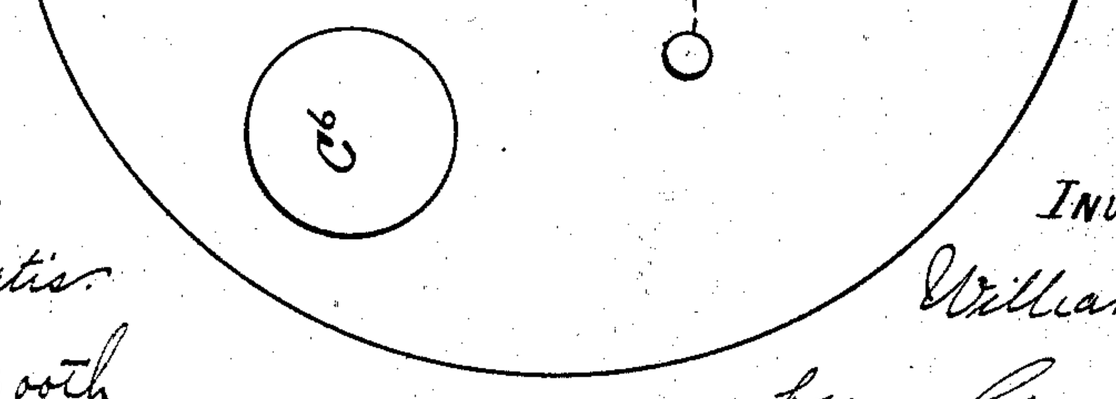

Fig. 9.

WITNESSES:
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UNITED STATES PATENT OFFICE.

WILLIAM H. LOOP, OF COHOES, NEW YORK, ASSIGNOR OF ONE-HALF TO STEPHEN V. LEWIS, OF SAME PLACE.

SHEET-METAL-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 413,451, dated October 22, 1889.

Application filed May 25, 1889. Serial No. 312,135. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. LOOP, a resident of Cohoes, in the county of Albany and State of New York, have invented certain new and useful Improvements in Sheet-Metal-Bending Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, that 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 the letters of reference marked thereon, which form a part of this specification.

Similar letters and figures refer to similar parts in the several figures therein.

My invention relates to improvements in sheet-metal-bending machines; and it consists of the novel construction and combination of parts hereinafter described, and pointed out in the claims.

Figure 1 of the drawings is a top plan view of my improved device with the middle portion broken away. Fig. 2 represents an end elevation of the same. Fig. 3 is a vertical cross-section taken on the broken line 3 3 in Fig. 1. Fig. 4 is a similar section showing the operation of the machine. Figs. 5, 6, and 7 are respectively cross-sectional views of different-sized mandrels used in bending the sheet metal. Fig. 8 is a cross-sectional view of a sheet-metal gutter the edges of which have been bent by my improved machine to form beads thereon. Fig. 9 is a plan view of an adjustable perforated mandrel-supporting plate, detached. Fig. 10 is a similar view of a plate having marked thereon diagrams by which the positions of the various perforations are determined. Figs. 11 and 12 show, respectively, modified forms of mandrel and product.

The bed-plate or bench A, supported in any convenient manner by legs A′, is provided with a series of groups of forming-clamps secured upon its upper surface. The several groups are each composed of three clamps B, provided with different-sized concaved formers B′, B^2, and B^3. The clamps are each made in two parts, hinged together at B^4, one part being secured to the bench, as by screws B^5, and the other part being adapted to swing to and from the bench, traveling on the dotted circular line B^6, B′ being the smallest former and B^3 the largest. The bench is provided at each end with mandrel-supports consisting, preferably, of perforated plates C, adapted to receive a mandrel D, made a little longer than the bed-plate, so as to project through the mandrel-supports. One or both ends of the mandrel are angular in form and adapted to receive an operating wrench or lever D′. The mandrel is detachable from the end supports, and the latter adapted to receive different-sized mandrels, as will be more fully explained, to fit the different-sized formers. I have shown three different sizes in Figs. 5, 6, and 7. The mandrel shown in Fig. 5 is the largest in diameter, and is adapted to be used with formers B^3. The one shown in Fig. 6 is of the same size as the one shown in Fig. 1, and is used with formers B^2, while that shown in Fig. 7 is used with formers B′. The bead E on one edge of the sheet-metal gutter E′ was formed by the mandrel shown in Fig. 5 and formers B^3, and the bead E^2 on the other edge by the mandrel shown in Fig. 7 and formers B′. It will be observed that the mandrels each have a radial slot D^2, which extends longitudinally of the mandrels, preferably their whole length.

To bend the metal of the desired cylindrical form, a mandrel of the required diameter, which should be about equal to the interior diameter of the desired cylinder, is inserted within the mandrel-supports at the ends of the bench, and the clamps having the formers corresponding in size with that of the mandrel swung over upon the mandrel to the position shown in Figs. 3 and 4. The edge of the sheet metal to be bent is inserted within the slot, as indicated by dotted lines S in Fig. 3. Before power is applied to rotate the mandrel the former-clamps are fastened down upon the mandrel by means of a bar F, extending longitudinally of the bench parallel with the mandrel and directly over the former-clamps. This bar is provided at each end with operating-handles F′, by which it is forced under the hooks or bar-clamps F^2, secured to the bench, as by screws F^3, inserted through their shanks F^4 in such a manner that when the bar is forced under the hooks it

holds the former part of clamps B pressed tightly against the mandrel. Then when the mandrel is rotated, as by wrench D′, the sheet metal S is wound upon the mandrel, and being subjected to the pressure of the former-clamps it retains permanently nearly the form of the mandrel. The metal may be wound once or twice around the mandrel, as desired in the formation of different kinds of beading or other work.

As the different-sized mandrels are frequently interchanged, I have provided a mandrel-support C, which may be easily and quickly adjusted to hold the mandrel in the required position.

All the mandrels should be held so that their lower sides will be located at the same distance from the surface of the bench, and when the edges of the concavities in the concave former-clamp nearest the hinges are equidistant from the hinges in one and the same straight line it is important that the sides of the different-sized mandrels nearest the hinges should be equidistant from the hinges to enter the concavities of the different-sized mandrels.

I make use of a plate C, preferably of heavy sheet metal, provided with a central aperture C′, adapted to receive a thumb-screw C^2, adapted to be screwed into the end of the bench to hold the plate against the same. The plate is also provided with the three pin-holes C^3, adapted to receive two at a time the pins C^4, fixed to project from the end of the bench. The plate is also provided with the different-sized mandrel-holes C^5, C^6, and C^7, adapted to receive the three different-sized mandrels.

When it is desired to change the mandrels, it is only necessary to loosen the thumb-screw until the plate can be drawn from the supporting-pins, then turn the plate until the mandrel-hole of the desired size is uppermost, and then slip the plate back upon the pins and turn in the thumb-screw. It is only necessary that care should be taken in forming the holes to give them the proper relative locations to cause the smaller mandrel-holes to assume their proper positions when the pins have entered their proper pin-holes.

I have shown in Fig. 10 a method of describing the circles representing the respective holes. A central point 1 in the plate C is first arbitrarily chosen, about which may be described circle 2, representing the central aperture C′. At three points equidistant from center 1 and from each other describe the three small circles 3, representing the pin-holes. At three other points equidistant from the center and from each other and equidistant from the circles 3 describe three circles 4, 5, and 6 of a diameter equal to the diameter of the largest mandrel. One of the circles, as 4, will represent the hole for the largest mandrel. About the other two circles 5 and 6 describe the squares 7 and 8, whose sides are equal to the diameter of the circles, so that two of their sides will be right angular to a radial line 9, drawn from the center 1 to the centers of the circles or squares. Then draw a diagonal line 10 from the centers of the squares and circles to similar corners of the squares bounded on one side by that side of the square nearest the center of the plate, and on these diagonal lines place one leg of a compass to describe a circle of the desired size for the respective smaller mandrel-holes, in such a manner that the circle shall come in contact with the two sides of the squares. The diagonal lines 10 are not essential and may be omitted when desired, as the proper center of the circle to be so described can be easily found by a few trials.

The circles 11 and 12 represent the proper location of the two circles representing the two smaller-mandrel holes.

The slot D^2 in the mandrel can be made on any angle relative to an intersecting radial line, and in Fig. 11 I have shown a cross-sectional view of the slot extended nearly at right angles to a radial line, which I term "tangential," to distinguish it from a radial slot. Such a form of slot is very important in performing some kinds of work—as, for example, in the manufacture of pipe lengths H. The edge of the sheet metal is inserted in the slot in the position indicated by the dotted line in Fig. 11, and the mandrel turned in the direction of the arrow, thereby forming the hooked edge H′, and then by a continuous operation giving the sheet of metal the cylindrical form shown in Fig. 12. The other edge H^2 of the sheet can be bent to a hook form in the same manner. After the mandrel is withdrawn the two hooked edges are interlocked, as indicated by the dotted lines in Fig. 12, and pressed together, forming a perfect cylindrical pipe.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a sheet-metal-bending machine, a rotary mandrel provided with a longitudinal slot and means for communicating thereto a rotary movement, in combination with a supporting-bench, a series of former-clamps hinged to the bench, and means for holding such clamps to the mandrel, consisting of bar F and bar-clamps F^2, secured to the bench, all substantially as described.

2. In a sheet-metal-bending machine, a rotary mandrel provided with a longitudinal slot and means for communicating thereto a rotary movement, in combination with a supporting-bench, former-clamps differing in size and individually hinged to the bench, and means for holding to the mandrel such of said clamps as may be desired, while the others are swung back from the mandrel, consisting of the bar F and bar-clamps E, secured to the bench, substantially as described.

3. In a sheet-metal-bending machine, an adjustable mandrel-support consisting of a metallic plate having a central aperture, a plurality of pin-holes equidistant from the central aperture and from each other, and a plu-

rality of different-sized mandrel-holes, the sides of which nearest the central aperture are equidistant therefrom, two supporting-pins adapted to enter such pin-holes, and a thumb-screw adapted to enter such central aperture and secure the plate upon such pins, in combination with the mandrel and a bed-plate, substantially as described.

4. In a sheet-metal-bending machine, an adjustable mandrel-support consisting of a metallic plate having a central aperture, a plurality of pin-holes equidistant from the central aperture and from each other, and a plurality of different-sized mandrel-holes severally in contact with two similar sides of imaginary inclosing-squares, one of which sides is nearest the central aperture and equal to the diameter of the largest mandrel-hole, the several inclosing-squares inclosing and described about imaginary circles of the same diameter as the largest mandrel-hole, which circles are equidistant from the central aperture and from each other, one side of each square being at right angles to the radial line drawn from the center of the plate to the center of the larger circle about which the square is described, in combination with a thumb-screw, supporting-pins, and a mandrel, substantially as described.

In testimony whereof I have hereunto set my hand this 21st day of May, 1889.

WILLIAM H. LOOP.

Witnesses:
FRANK C. CURTIS,
CHAS. L. ALDEN.