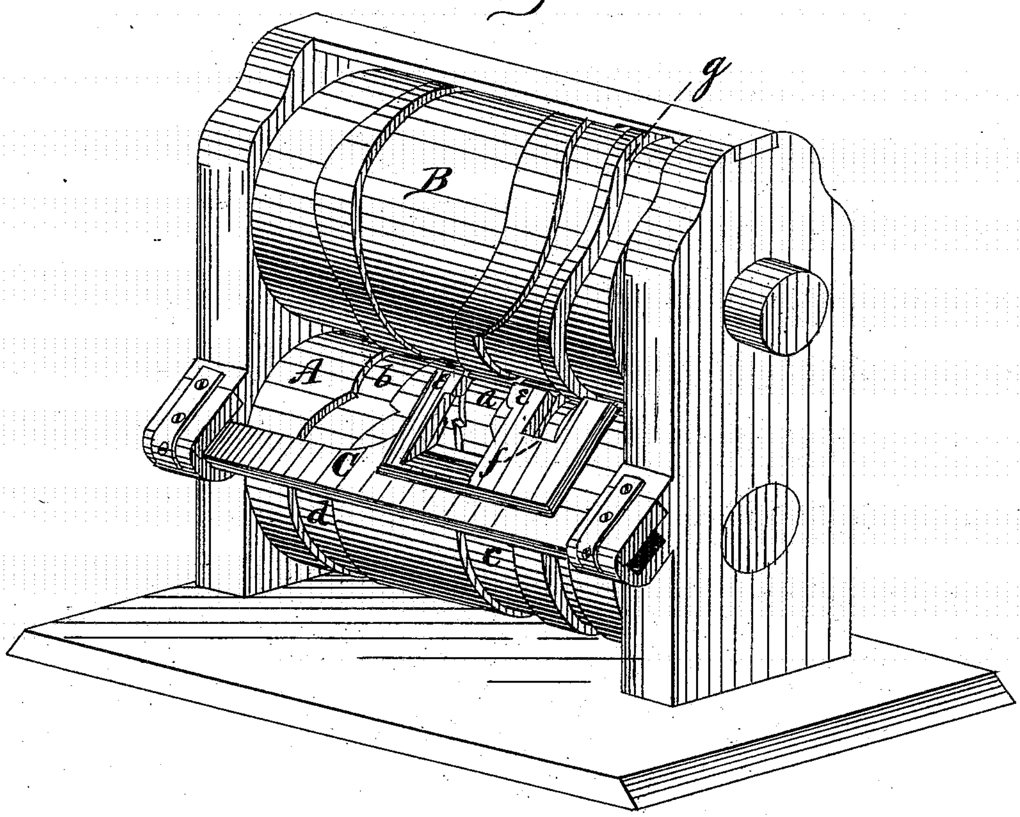
S. DUFF.

MACHINES FOR ROLLING METALS OF IRREGULAR SHAPE.

No. 187,110. Patented Feb. 6, 1877.

Fig. 1



Witnesses
F. A. Pollock.
G. Smith

Samuel Duff, Inventor

By Connolly Bros & McTighe

Attorneys

2 Sheets—Sheet 2.

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Fig. 2.

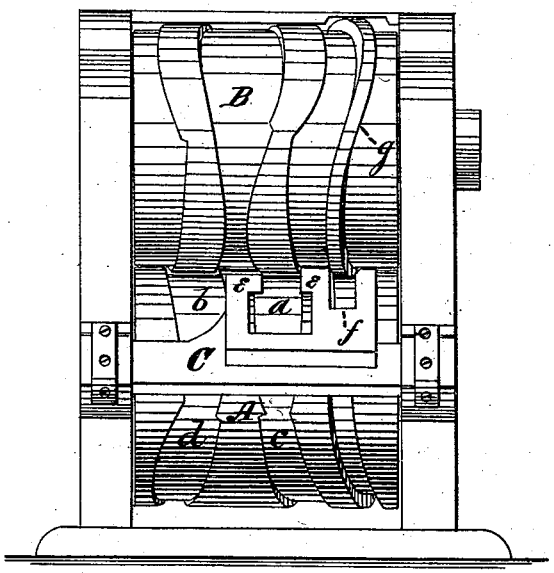


Fig. 4.

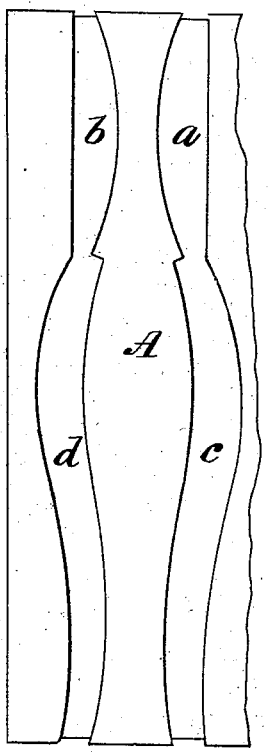
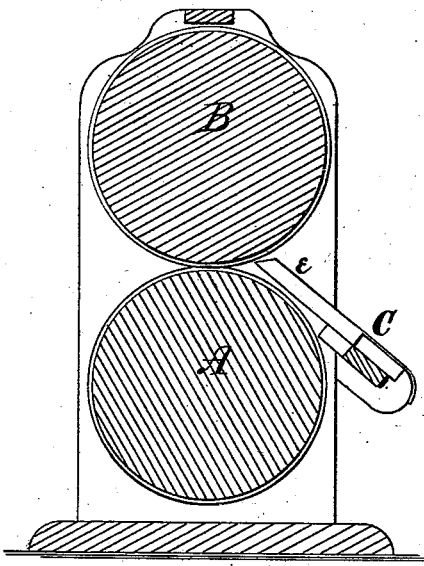


Fig. 3.



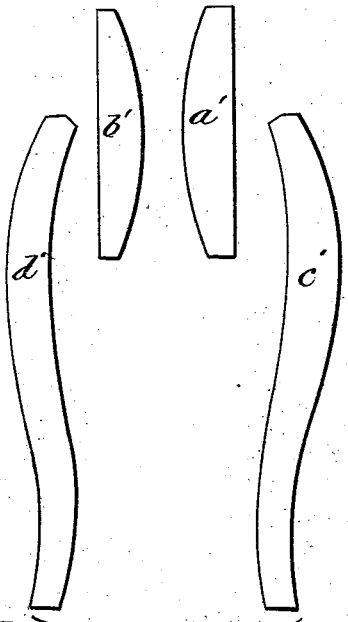


Fig. 5

Witnesses

F. A. Pollock.

G. P. Smith.

Samuel Duff. Inventor

By Connolly Brown & Wolfe

Attorneys

UNITED STATES PATENT OFFICE.

SAMUEL DUFF, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR ROLLING METALS OF IRREGULAR SHAPES.

Specification forming part of Letters Patent No. **187,110**, dated February 6, 1877; application filed November 27, 1876.

To all whom it may concern:

Be it known that I, SAMUEL DUFF, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Rolling Metal; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is an isometrical perspective of my machine. Fig. 2 is a front elevation. Fig. 3 is a vertical transverse section. Fig. 4 is a view representing the surface of the grooved roll, reduced to a plan. Fig. 5 is a representation of the blank or form for a plow-beam as it appears during the successive stages of the compressing process.

This invention relates to improvements in machines for rolling and bending metal bars to irregular forms, such as plow-beams and analogous shapes; and consists in the construction of the rolls, and their combination with a bending device, substantially as hereinafter described and claimed.

The machine is constructed with two rolls, A and B, roll A having grooves cut circumferentially in its face, and roll B having corresponding collars, as hereinafter shown. Fig. 4 represents the surface of roll A reduced to a plane, and shows the configuration as adapted to the rolling of a plow-beam, bent and finished, from a rectangular billet. Each groove is made up of two portions. In one groove is the first pass, *a*, in which the billet is compressed so as to spread out to the curve on the inner edge of the pass *a*. In the other groove a corresponding portion, *b*, is found for the second pass, but in reverse position, so that the partially-formed beam will be reversed for this pass, in order that the "fins" formed in the first pass may be worked off. In both these passes the billet may or may not be somewhat lengthened, according to the amount of reduction. The groove of the first pass is then continued, and becomes the portion *c* for the third pass; but as the shape of this portion precludes the possibility of simply rolling a bar to conform, it becomes necessary to introduce another element to co-operate, and that is my bending device, which I shall now describe. Sliding in boxes projecting from the housings is a rest-bar, C, inclining laterally up to the passes, and recessed to form the bending-faces *e*, which follow the curve of the article desired, and thus bend it into shape at the proper points just before the bar is bitten by the rolls. The bending device is given the proper motions by being slotted at *f*, and thereby straddling a collar, *g*, which is formed, preferably, on the roll B, and so adjusted with relation to the grooves and collars of the rolls that it will move the bender *e* exactly as it is required to bend the billet. Of course the other roll is grooved to correspond. This being understood, the billet, after having traversed passes *a* and *b*, is inserted between the bending-faces *e* and into the rolls. As they revolve the bending device is caused to move from side to side through the medium of collar *g* and slot *f*, and thus the bar or billet is bent to the proper form while passing between the rolls in the third pass. In the fourth pass, the bar, being now bent, requires no guide, but follows the finishing-groove *d*, which is made slightly smaller than groove *c*, and reverse in position, like *a* and *b*, so as to take off any fins that may have been formed. By having the rolls three high, the passes may be made from alternate sides.

In practice, I would dispense with the bending device for the first two passes, substitute a plain apron or guide, and work up a large number of billets in them first; then reheat the billets, put on the bending device, and make the last two passes after reheating.

In Fig. 5 of the drawing the blank is shown as it appears during the successive stages of the operation for forming a plow-beam, the letters *a'*, *b'*, *c'*, and *d'* designating the blanks, respectively, according to the order of the passes, *a'* being the bar after the first pass, *b'* the bar after the second, and so on.

The plow-beam is but an illustration, as the rolls can be formed for rolling and bending any analogous form, by having the proper configuration to the grooves and collars, and arranging the guiding-collar to correspond.

I claim—

In a machine for rolling straight bars into

irregular forms, the combination, with a pair of rolls having suitable grooves and corresponding collars, of a sliding guide or bending device, arranged and operating substantially in the manner and for the purposes described.

In testimony that I claim the foregoing I have hereunto set my hand this 24th day of November, 1876.

SAML. DUFF.

Witnesses:
WM. KING,
JOHN D. HOERR.