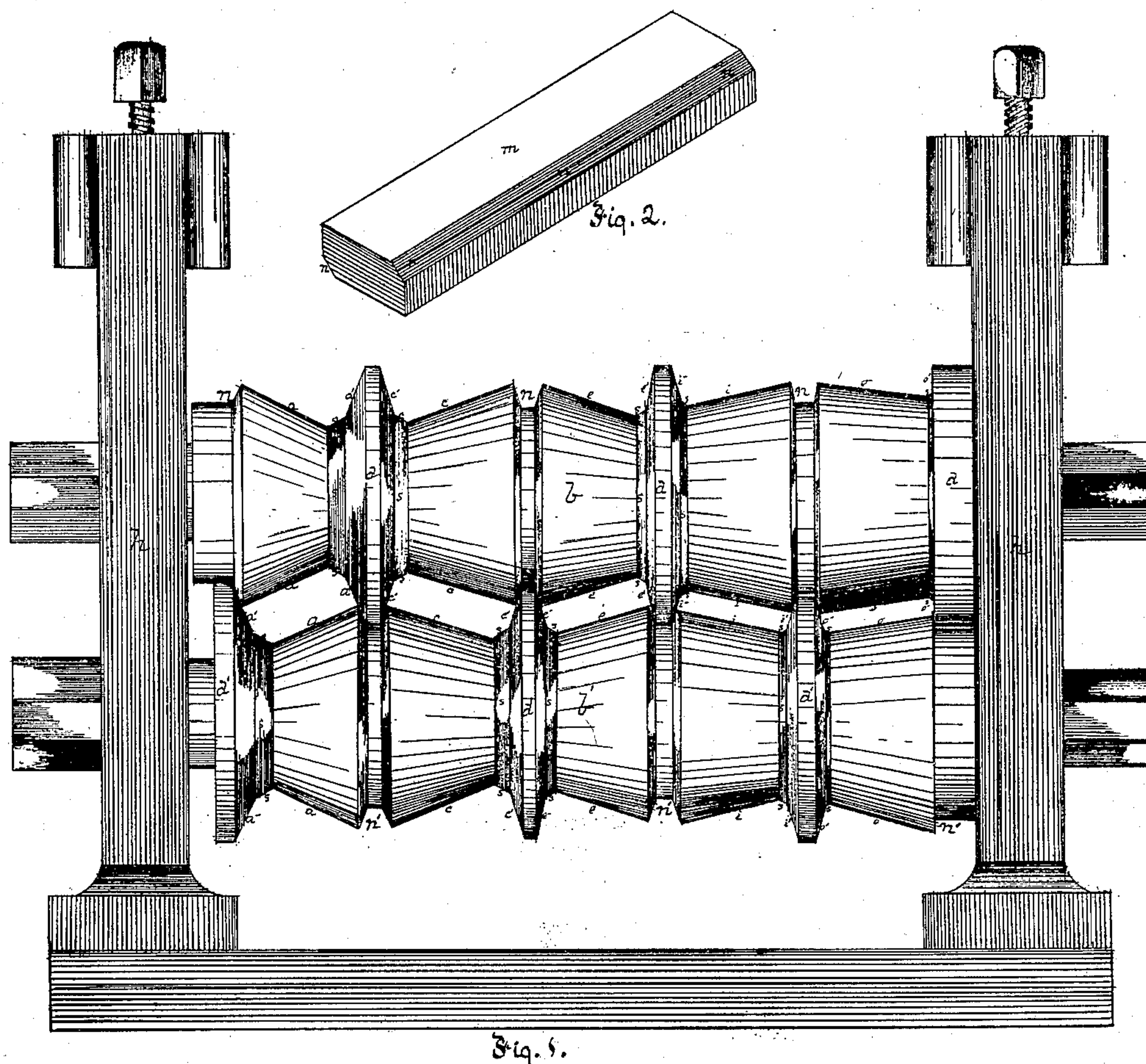


J. I. WILLIAMS.
APPARATUS FOR ROLLING METAL.

No. 98,900.

Patented Jan. 18, 1870.



Witnesses:
Thos Kerr
R. Wrenshall

Inventor:
John I. Williams,
by B. A. W. W. W. W. W.,
his Attys.

United States Patent Office.

JOHN I. WILLIAMS, OF MILLVALE, PENNSYLVANIA.

Letters Patent No. 98,900, dated January 18, 1870.

IMPROVED APPARATUS FOR ROLLING METAL.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, JOHN I. WILLIAMS, of Millvale, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in Rolls for Rolling Iron; and I do hereby declare the following to be a full, clear, and exact description thereof.

In the rolling of bar-iron, or of iron the width of which is greater than its thickness, grooved or grooved and tongued rolls are commonly used. In either case a flash or fin is formed on the bar, along the bar, at the "part" of the rolls, or at the joint of tongue and groove, which renders it necessary to turn the bar at each pass, in the grooved rolls, a quarter of a revolution, and in the tongued and grooved rolls, a half of a revolution, in order to roll in or down at each pass, the flash or fin formed at the preceeding pass. If it be desired to reduce the bar in width, as well as in thickness, deep grooves have to be cut in the rolls, so that the bar can be passed through edgeways, whereby the strength of the roll is very much weakened, especially in view of the unequal expansion and contraction caused by contact with heated iron, so that, practically, more rolls are broken than worn out.

My invention is designed to obviate these difficulties in the rolling of ordinary bar-iron, as well as to accomplish what has, so far as I am aware, never yet been done, viz, the rolling of skelp and nail-plate iron to the desired width and thickness, and with edges so straight and sound as to avoid the necessity of shearing or trimming them.

Hence, the nature of my invention consists in an improved construction of rolls for rolling bar-iron, or iron of a definite fixed width greater than the thickness desired.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and mode of operation, referring, for that purpose, to the accompanying drawing, making a part of this specification, in which—

Figure 1 is a front elevation of a pair of my improved rolls, and

Figure 2 is a perspective view of a bar of iron, as produced from the rolls.

Like letters of reference indicate like parts in each.

In making the rolls *b b'*, the mechanical work of casting and trimming is done in the usual way. The rolls are mounted in housings, *h*, which, with the bearing-blocks, couplings, gearings, &c., are of the usual or any known construction.

In each roll, however, I have a series of grooves, *a a', c c', e e', i i', o o'*, of gradually-decreasing size, so as, by successive passes of the iron through such grooves, to reduce it in breadth and thickness. Each groove, as made in each roll, presents two working-faces, the one, *a c e i o*, being of the length equal to the breadth

to be given to the side of the bar, bloom, or billet at that pass, and the other working-face, *a' c' e' i' o'*, as of a length equal to the thickness to be given to such bar at that pass, and each pair of faces, *a a'*, &c., making a right angle with each other, or such other angle as may be desired, and the corresponding opposite faces *a a' a'*, &c., in the opposite rolls, being opposite to and parallel with each other, and all being inclined or oblique to the axial line of the rolls.

It will then be observed that all the working-faces of each pair of grooves take a bite on the bar, bloom, or billet, as it is passed through, and act thereon in such a way as to draw and reduce it both in thickness and width, thus accomplishing at one pass as much as, in grooved rolls of the ordinary construction, is accomplished in two passes.

Consequently, by carrying on the rolling more rapidly, I am able to complete it while the bar still retains the greater part of its heat, and hence, not only save time and labor, but also produce a better quality of iron, and at double the speed. I also avoid the necessity of turning a deep groove in the face of the roll for rolling the bar on its edge, and thus lessen very much the danger of its breaking. This will be the more apparent when it is remembered that in grooved rolls of an ordinary construction, the grooves for rolling the bar, when passed through on its edge, must each be equal to one-half the width of the bar to be produced, and that the strength of a roll is only equal to the strength of its weakest part, while, on the other hand, in the rolls described, the depth of each groove is not only less than one-half of the width of the bar to be produced, but even less than its thickness. Consequently, in rolls of the same size, I am enabled to secure far greater strength, and to the rolls a longer average life.

In order to avoid the formation of a flash or fin on the bar, at the "part" of the rolls, and so save the necessity of turning the bar at each pass, I make, in fitting up the rolls, a fillet, *s*, in each groove, at the angle of each pair of working-faces.

Such fillets then chamfer or bevel the obliquely opposite corners of the bars, as shown at *n n*, in the bar *m*, fig. 2, which chamfered corners, at the next pass of the bar through the next groove, come at the "part" of the rolls. The size of each fillet *s* is such, as near as may be, that the reduction of the metal in the next pass of the bar shall about fill out the chamfered corner so made. In this way, I save the labor of turning the bar at each pass, and at the last reducing and drawing-pass, I turn out a finished bar, without necessarily requiring the use of separate finishing-grooves.

I also find, in practice, that by rolling and drawing both the sides and ends at the same time, I produce bars having a shorter length of ragged and waste ends to be cut off and again worked over.

Also, it appears from practical tests, that where, as

in the rolls described, the bar is "drawn" on all four faces at the same time, less power is required than in the ordinary rolls, where the bar is operated on, and "drawn" only on two faces at each pass. Hence, I effect a saving of time, power, labor, and iron.

Another important advantage is secured in the rolls described, by the alternate arrangement of the collars d d' ; that is to say, one collar d , on one roll, forms one edge of the bar, while the collar d' , that forms the other edge of the bar, is on the opposite roll. In rolls, as heretofore made, there is a tendency to give a slight curvature or bend to the bars. In rolls made as above set forth, the tendency, in either of the collars d d' , to produce such a result is effectually counteracted by the other collar, which tends to the same result, but in an opposite direction, so that the bar is delivered from the rolls free from twist, bend, or distortion.

The collars d d' , should, in every case, project beyond the working-face of the opposite roll, and enter a groove, n or n' , made therein for that purpose. This feature enables me the better to prevent the formation of a fin at the "part" of the rolls, and also enables me to introduce into the rolls, and reduce a bar or billet of greater width than would otherwise be practicable or even possible.

As already stated, by the use of rolls, such as are described, I am enabled to roll skelp and nail-plate iron to the exact width and thickness desired, and with edges so well defined, and so straight and sound, that they need no trimming or shearing. Such iron, it is well known, has heretofore been rolled in large sheets, and cut or sheared to the desired width, with, of course, a considerable loss in waste edges.

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

1. In a pair of metal rolls, a fillet, s , arranged at the junction of the obliquely-inclined working-faces of each or any of the grooves, substantially in the manner and for the purposes hereinbefore set forth.

2. In a pair of metal rolls, a pair of collars d d' , in combination with the obliquely-inclined working-faces of an included reducing and rolling-groove, each such collar projecting into, and operating in a groove, n or n' , in the roll opposite thereto, substantially as described.

In testimony whereof, I, the said JOHN I. WILLIAMS, have hereunto set my hand.

JOHN I. WILLIAMS.

Witnesses:

A. S. NICHOLSON,
R. C. WRENSHALL.