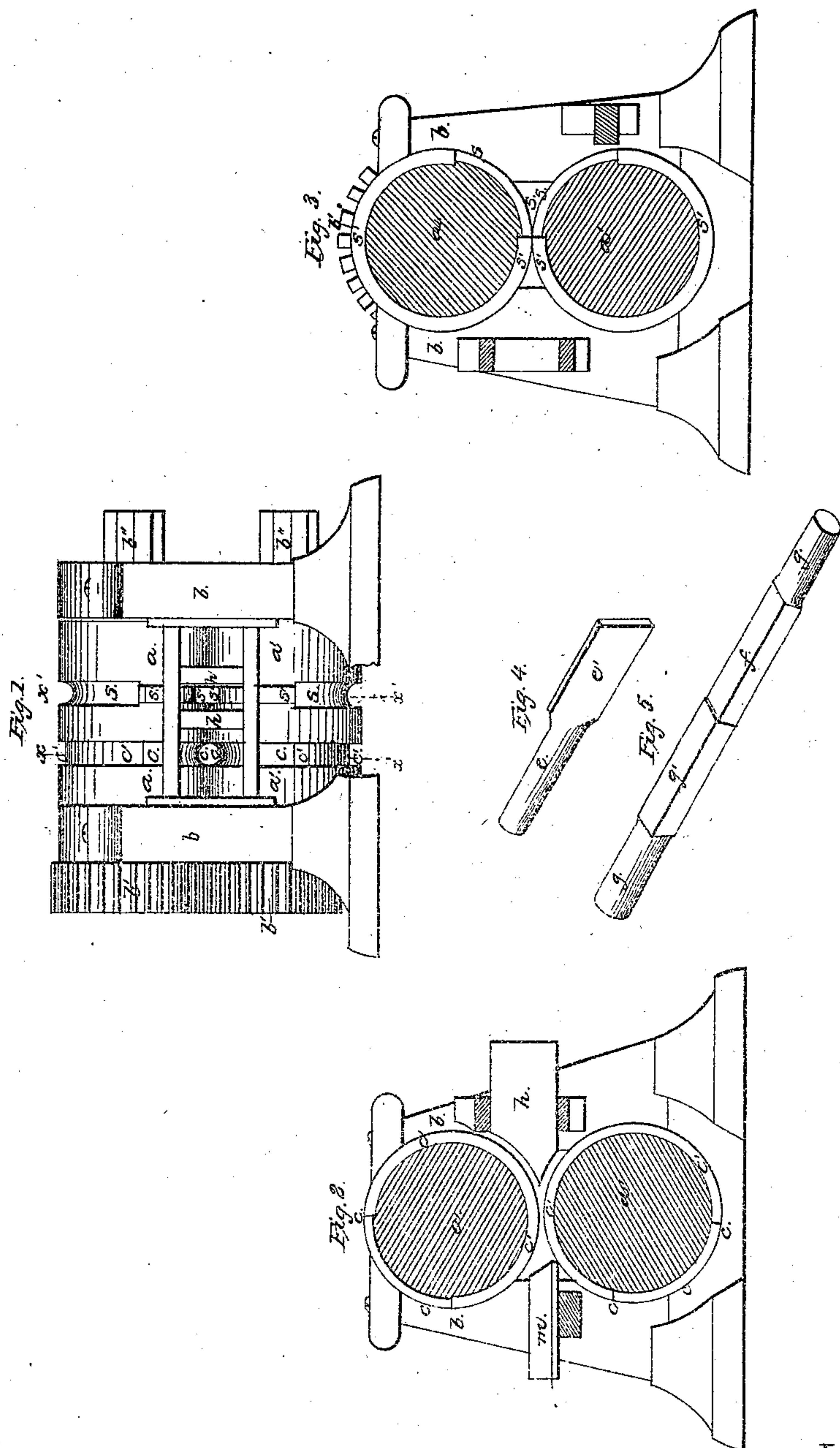


W. BUNTON & J. DAVIS.
METHOD OF ROLLING BARS OF METAL.

No. 85,273.

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Witnesses:

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WILLIAM BUNTON, OF PITTSBURG, AND JOHN DAVIS, OF BIRMINGHAM, PENNSYLVANIA.

Letters Patent No. 85,273, dated December 29, 1868.

IMPROVED METHOD OF ROLLING BARS OF 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 we, WILLIAM BUNTON, of Pittsburg, and JOHN DAVIS, of Birmingham, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in the Manufacture of Bolts; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—

Figure 1 is a side elevation of a pair of cylindrical metallic rolls, with grooves for rolling iron alternately flat, square, and round.

Figure 2 is a vertical section of the same, through the line $x-x$ of fig. 1.

Figure 3 is a like section, through the line $x-x$ of fig. 1.

Figure 4, a perspective view of a round and flat bar, illustrates, in part, our mode of rolling; and

Figure 5, a perspective view of a flat, round, and square bar, further illustrates our method of manufacture.

Like letters of reference indicate like parts in each.

Our invention relates to the manufacture of carriage-bolts, carriage-straps, clips for swingle trees, auger-blanks, and other articles, one or more parts of which are round or oval, and other parts of which are flat or square, and consists in an improved method of manufacturing such articles by rolling them in a particular manner between grooved rolls of peculiar construction, from bars rectangular in cross-section.

To enable others skilled in the art to make and use our invention, we will proceed to describe the same, with particular reference to the manufacture of carriage-bolts, the mode of operation in the manufacture of the other articles named or referred to being substantially the same.

In carriage-bolts there are required a head round, square, or hexagonal, a square shoulder under the head, and a round shank below the square shoulder. Efforts have been made to roll the square shoulder and round shank from a square rod or bar, but in doing so certain difficulties have been encountered:

First, the rod or bar must obviously be at least large enough to fill the square part of the grooves, and such a rod or bar, when it comes to the round part of the grooves, must necessarily be drawn or reduced so as to form a "round" of a diameter not longer than the length of the side of the "square." Such reduction of a "square" to a "round" almost invariably results in the formation of a flash or fin on each side of the "round" at the "part" of the rolls, and of course the rod is useless till such flash or fin is removed or worked in.

Second, if a square rod or bar be used larger than the square part of the groove, such a flash or fin will be formed along both sides of both the "square" and "round" in the bar produced.

The practical difficulties thus arising from the formation of a flash or fin we obviate by rolling round or oval and flat or square iron from a flat bar, such bar being passed through on its edge between rolls grooved for forming the "square" and "round" parts successively, the thickness of the bar to be operated on always being a little less than the breadth of the grooves. In this way we secure the requisite draught to carry the rod or bar through between the rolls, and also provide room, between the sides of the bar and the sides of the grooves, for the spread of the iron, without its being forced out between the rolls into a flash or fin. The rolls, as is well known, have both a drawing and a reducing action, the latter being that which tends to form the flash or fin.

Now, our invention consists, in part, in making both the square and round sections of the grooves of a breadth a little greater than the thickness of the bar to be operated on, and for some purposes, though not always necessary, we make the round or oval sections of the grooves of a diameter a little greater than the length of a side of the square section. But this will seldom be necessary, since an oval-bottomed groove, other things being equal, will draw the iron somewhat more than a square-bottomed groove. Hence, the tendency to form a flash or fin when rolling a flat bar on its edge, will, in the former, be so much less. Thus, there is left a little space between the sides of the rod or bar and the sides of the round and square groove, for the spread of the iron under the reducing-action of the rolls. Hence, we reduce the iron only so much as is necessary to fill the grooves, and are enabled to roll iron alternately round, oval, flat, or square, without flash or fin, from a flat bar, in a single pair of rolls, by a single pass and continuous rolling.

$a a'$ are a pair of cylindrical metallic rolls, mounted in any suitable housings, b , and connected by gear-wheels b' . By couplings b'' , we connect them with other rolls. These rolls, $a a'$, are, in the drawing, so grooved as to illustrate our invention.

The grooves $c c'$, in one end of the rolls, are made round and square, that is to say, one or more parts c of the grooves are, in each roll, semicircular in cross-section, so that, when the rolls operate, the grooves c at those points will give a circular aperture. Other parts, c' , of the groove, in each roll, are the half of a square, so that as the rolls $a a'$ play against each other at those points, such grooves will give a square aperture.

In the opposite ends of the rolls $a a'$ we have shown a somewhat different construction of grooves, $s s'$ being semicircular grooves, which give a round aperture, as before, for reducing the rod or bar to a "round," and $s' s'$ being narrower, but of such width and depth as to give a rectangular aperture. The grooves $c c'$ are designed to roll round and square iron; the grooves $s s'$ to roll round and flat iron.

Figs. 4 and 5 illustrate, by views somewhat enlarged, the character of the work we do. In fig. 4, *e* is the round part of a bar as formed in the grooves *s*, and *e'* the flat part, as formed in the grooves *s'*. In fig. 5, *f* is a part of a bar, rectangular in cross-section, but which may be of any other shape in which the depth shall be greater than the breadth. From such a bar, in square grooves *c'* and round grooves *c*, we roll the "square" *g'* and the "round" *g*.

The length and order or arrangement of the differently shaped grooves *c* & *s'*, with reference to each other, may be varied at pleasure, or so as to be adapted to the work to be done, and, if so desired, all three grooves may be arranged successively and continuously around the rolls *a a'*, so as to produce a continuous bar of alternately round, flat, and square iron, as in fig. 5.

The feature of our invention, on which we lay particular stress, is this: that the bar from which, in the rolls described, we roll iron alternately round and flat, or round and square, or round, flat, and square, must be broader in one direction than in the other, or, in other words, its depth must be greater than the distance between the bottoms of the grooves at the point of bite, and its thickness must be less than the breadth of the square part *c'* of the groove, and not in excess of the breadth of the part *s'*, which forms the flat part *e'* of the finished bar, and also that the bar must be passed through the rolls on its edge. The consequence, then, is that the flat bar *f*, passed on its edge through the grooves *c'* & *c*, being thinner than those grooves are wide, will, under the action of the rolls *a a'*, be both drawn and reduced, the drawing action of the rolls operating to lengthen the bar, and the reducing action of the rolls operating to spread it. But the bar being thinner than the grooves are wide, there will be left sufficient room between the bar and the sides of the grooves for the spread of the iron under the reducing-

action of the rolls. Consequently, the bar will spread out alternately into a round and square shape, without being forced out into a flash or fin at the "part" of the rolls. The same is true of rolling a flat bar in grooves *s s'*, or in grooves so shaped and arranged as to produce a "flat," a "round," and a "square" from the same bar, at a single pass, and in a continuous rolling.

In order that the bar may be passed through the rolls on its edge, we use guides *h*, which are supported or held in place in any convenient way. Such guides should be so set that they will feed the bar accurately into the middle of the grooves, and while it is passing in, hold it rigidly in a vertical position.

A delivering-guide, *m*, is placed on the rear of the rolls, to deliver the bar as it comes through.

The grooves *c' s'* may, if so desired, have inclined or bevelled sides, so as to give other than right-angled corners to the strap part of the article produced.

Our invention is applicable not only to rolling the round shank and square shoulder of carriage or other bolts, with a square or flat part to be upset into a head, but also to the making of other articles, which at some stage of the manufacture have to be brought to a shape alternately round or oval, and flat or square, such as those hereinbefore named.

What we claim as our invention, and desire to secure by Letters Patent, is—

The method, herein described, of rolling successively different sections of a bar of metal to different forms.

In testimony whereof, we, the said WILLIAM BUNTON and JOHN DAVIS, have hereunto set our hands.

WILLIAM BUNTON.
JOHN DAVIS.

Witnesses:

A. S. NICHOLSON,
G. H. CHRISTY.