T. C. RICE.

Making Wrench Bars.

No. 64,447. Patented May 7, 1867.

Fig. 13

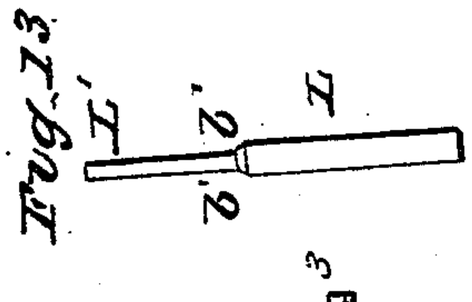


Fig. 14

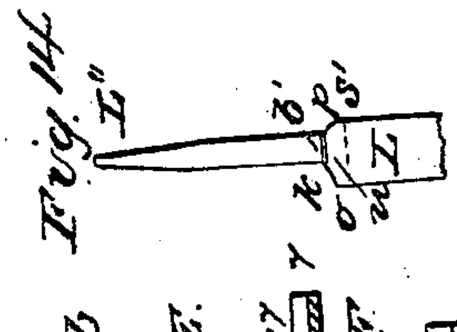


Fig. 2

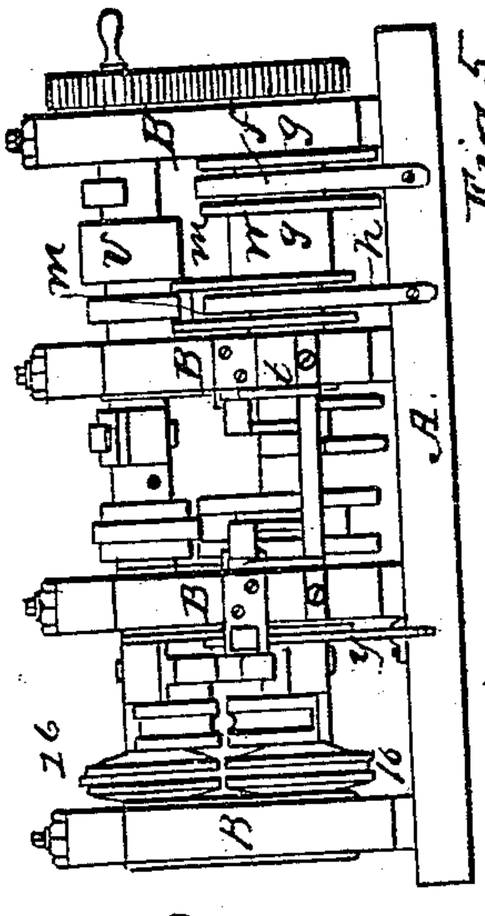


Fig. 5

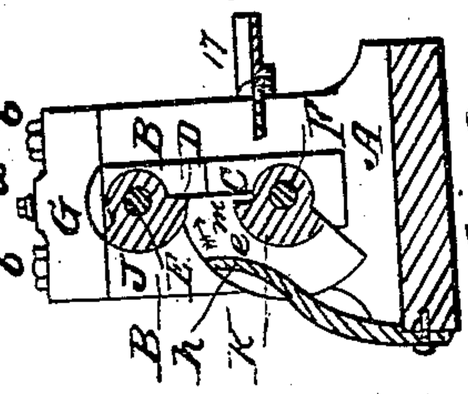


Fig. 6

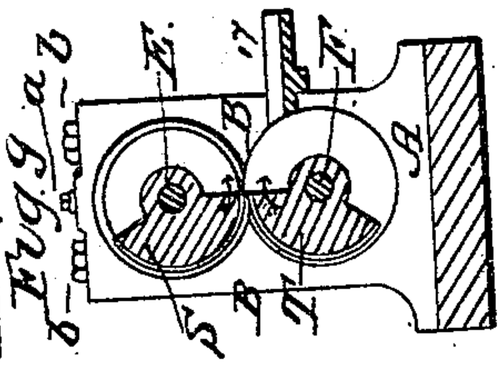


Fig. 10

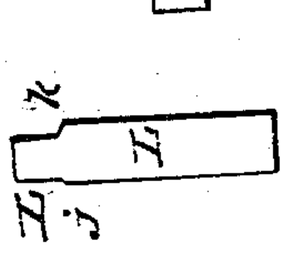


Fig. 11

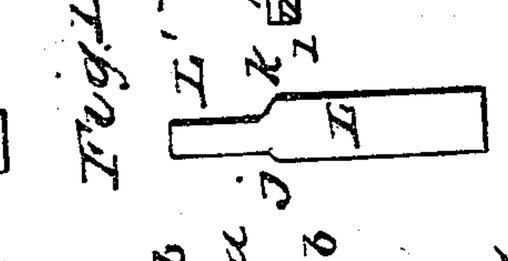


Fig. 12

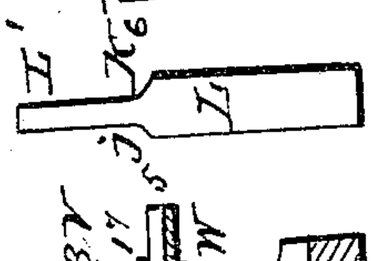


Fig. 4

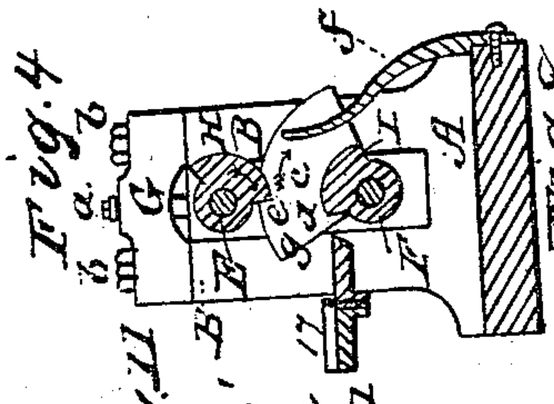


Fig. 8

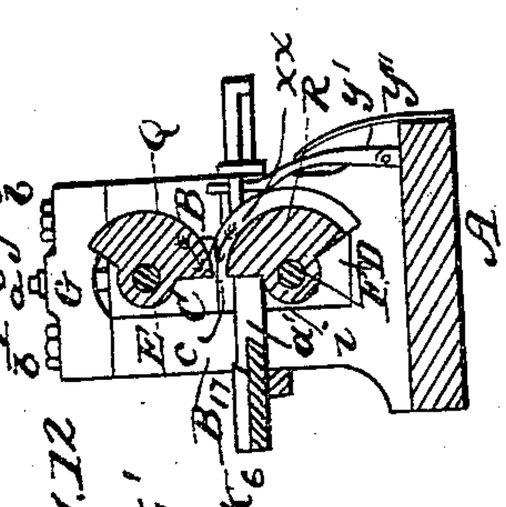


Fig. 1

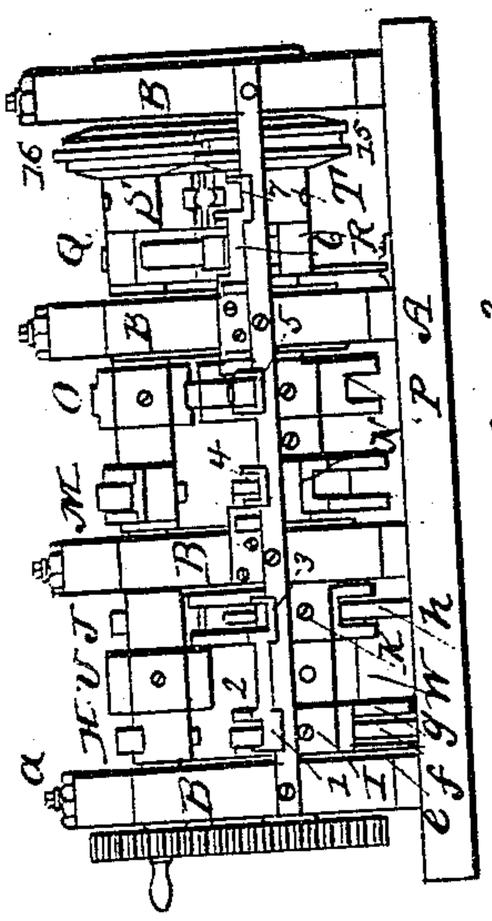


Fig. 3

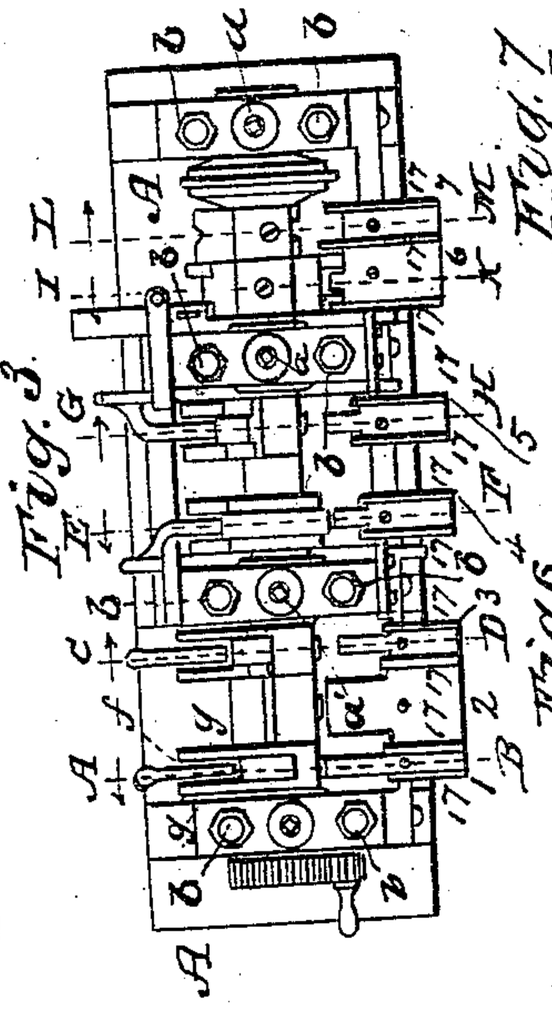


Fig. 7

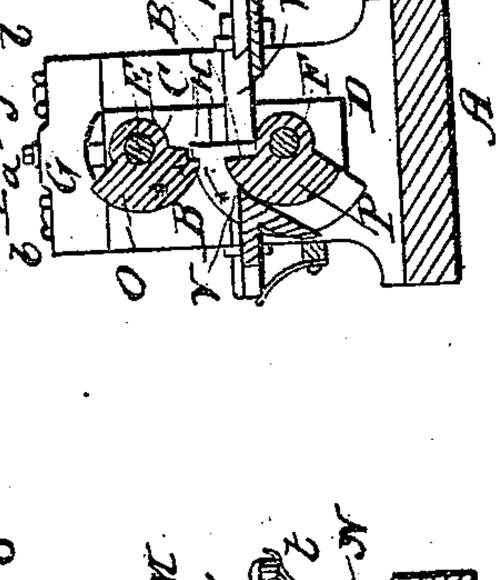
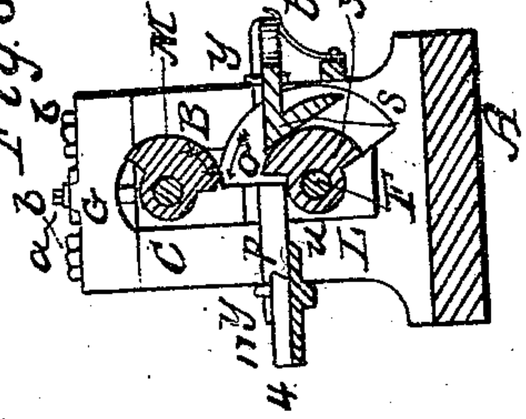


Fig. 9



WITNESSES

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D. L. Miller

INVENTOR

J. C. Rice.

United States Patent Office.

T. C. RICE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THOMAS H. DODGE AND T. W. WELLINGTON, OF SAME PLACE.

Letters Patent No. 64,447, *dated May* 7, 1867.

IMPROVED APPARATUS FOR ROLLING WRENCH-BARS.

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, T. C. RICE, of the city and county of Worcester, and Commonwealth of Massachusetts, have invented certain new and useful improvements in Machines for Rolling Wrench-Bars and other similar articles; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a front view of the machine.

Figure 2 represents a back view of fig. 1, the machine being shown turned around so as to bring the gearing to the right.

Figure 3 represents a plan or top view of fig. 1.

Figure 4 represents a section on line A B, fig. 3, looking in the direction of the arrow on said line.

Figure 5 represents a section on line C D, fig. 3, the arrow indicating the line of vision.

Figure 6 represents a section on line E F, the arrow indicating the view to the left.

Figure 7 represents a section on line G H, fig. 3, looking to the right.

Figure 8 represents a section on line I K, fig. 3, looking to the left.

Figure 9 represents a section on line L M, fig. 3, looking to the right.

Figures 10, 11, 12, 13, and 14 represent the wrench-bar as it appears after being subjected to the action of the different sets of rolls, as will be hereafter more fully described.

In the drawings, A represents the base of the machine, from which rise the strong upright pieces B B B B, in which are slots or openings, to receive the boxes or bearings C and D of the shafts E and F. The boxes or bearings C are held down by means of screw-bolts *a*, which pass down through the cap-pieces G, secured to the top of the upright pieces B by bolts *b*.

The object of my present improvements is to facilitate the manufacture of wrench-bars and other similar articles in which a head or projection is required upon one or both sides of one end of the reduced bar; and the nature of my invention consists in the construction and use of rolls of peculiar formation, whereby such articles can be produced in a more expeditious and uniform manner than by the ordinary mode of trip-hammer and hand-forging.

To enable those skilled in the art to which my invention belongs to make and use the same, I will proceed to describe it in detail.

Upon the left end of shaft E, figs. 1, 3, and 4, is fastened a segmental roll or wheel, H, which works into a groove formed by segments *c* on the segmental roll or wheel I upon shaft F. The front part *d* of the grooved segmental roll I extends forward further than the front part *e* of the segmental roll H, so that, when a bar of iron is introduced and subjected to the action of the rolls H and I, the shoulder is thrown entirely upon one side. In this case the shoulder or head would be thrown up by the face or front part *e* of roll H, the part *d* supporting the lower side of the bar, so that the part of the bar which is being reduced remains straight and on a line with the face of the main bar. The rolls all run towards the feed-tables 1, 2, 3, 4, 5, 6, and 7, as indicated by arrows, so that the bar of iron has to run in between the rolls when the cut-away parts of the rolls are towards each other. In the case just described the bar of iron would be placed upon feed-table 1, and run back until the end struck the stop-bar *f*, there to remain until the rolls H and I came around into the positions shown in fig. 4, when the end of the bar would be reduced upon the upper edge, while the sides *g g* of the grooved roll I would keep the metal from lateral expansion, and the end of the bar, from the stop *f* to where the points *d* and *e* come in contact with the bar, would be reduced in breadth as the bar moved towards the operator. In case a head or projection is required on one edge of greater depth than can be easily formed by one set of rolls H I, then the partially reduced bar is passed between and subjected to the action of another set of rolls similar to H I, only set nearer together, and so on, until the bar is reduced sufficiently to leave the proper head or projection, when the reduced end, with so much of the main bar as is required to form the head, is cut off, and the operation repeated until the main bar is all worked up.

It is more generally required, however, to have the head project some upon both sides, and also at the top and bottom of the bar. This is true of most classes of screw-wrenches. In many kinds of screw-wrenches, in

addition to the projections above mentioned, the lower projection, which forms what is termed the stationary jaw, is required to be, in many cases, more than twice as great as the projection upon the upper side. In rolling this class of work, the rolls are made a little different from those above described, as will now be explained.

The first set of rolls J K to which the bar is subjected is formed as shown in fig. 5, which is a cross-section on line C D, fig. 3, and the effect upon the bar L is shown in fig. 10. The recess or notch *i*, in the face of roll J, forms the slight projection *j* from the reduced part L′, while the face of the segmental grooved roll K forms a greater projection, *k*, below the reduced part L′ of the bar L, as shown in fig. 10. The bar L, in this instance, is fed in from table 3 until it strikes stop *h*, which is to be set at the proper distance to permit of the rolls J and K closing upon so much of the bar L as is sufficient to form the bar L′ and shank L″ of the wrench. The part L′, after being acted upon by rolls J and K, and reduced in depth, as indicated in fig. 10, is run from table 4, between the rolls M N, which are constructed like rolls J and K, with the exception that they are made a little larger, so that their surfaces run closer together, while the recess or notch *n*, in the face of roll M, is greater than the notch or recess *i* in roll J, to increase the projection *j* on the top of the part L′. By the action of rolls M N, the part L′ is still further reduced in breadth, as indicated in fig. 11, while it is retained by the flanges or sides *o* from lateral expansion, the same as it was by the flanges or sides *m* while being acted upon by rolls J and K. In feeding in the bar L′ to the rolls M N, it becomes necessary to have an adjustable stop, in order to have the rolls commence to act upon the bar in the same, or nearly the same, position in each case. For that purpose a slide-bar, *p*, is arranged to work in guides *y y*, with a stop-piece, *s*, attached to its rear end, and so made as to fit the groove in roll N. Slide-bar *p* and stop-piece *s* are forced forward by a spring, *t*, fastened to a piece attached to the lower ends of two of the upright pieces B. The stop-piece *s* is so arranged that when the cut-away part of the segment-roll N is towards the stop *s* the latter will press against the face of said segment, as shown in fig. 6.

The operation of stop *s* in the case last cited is as follows: The operator takes bar L, after it has been acted upon by the first set of rolls J K, and the end reduced, as shown at L′, fig. 10, and runs the end L′ over table 4, and between rolls M and N, until the shoulder or projection *k* strikes against the point of stop *s*, and then waits until the rolls M and N come around, when stop *s* is forced back by the lower roll, and the rolls acting upon the part L′ of the bar L, reduce the part L′ in depth still more, as indicated in fig. 11. The operator now runs the part L′ over table 5, and between rolls O and P, until the shoulder or projection *k* strikes the point of stop *v*, attached to slide-piece *w*, supported and arranged the same as slide *p*. When rolls O and P come around, stop *v* is thrown back, as shown in fig. 7, while the part L′ of bar L is reduced to the proper size, as shown in fig. 12.

The rolls O and P are constructed the same as rolls M and N, only larger, so that they run closer together, and the notch or recess *x* in the face of roll O is deeper than the notch *n* in roll M. The operator takes bar L, after the part L′ has been reduced by rolls O P, as above described, and turns it over on the side upon table 6, and in that position runs the end L′ between the rolls Q and R, when they are in such a position that the hinged bar *y′* rests against the surface *z* of the hub of roll R, which brings the point of stop *v* into the proper position to receive the shoulder or projection *j* of bar L, as it runs in. As soon as the operator feels the shoulder *j* strike against the point of stop *v* he stops the forward motion of the bar, and as rolls Q and R come around, one of the sides or flanges *x x* of roll R forces back to the position shown in fig. 7 the hinged bar *y′*, which in turn forces back stop *v*, which is attached to the slide-piece *a′*, supported in guides same as slides *w* and *p*, and has a hole in the rear part, through which the end of lever or bar *y′* projects, as shown in the drawings. A spring, *y″*, is so arranged as to keep the bar *y′* always forced forward as far as the hub *z* and the flanges or sides *x x* of roll R will permit. As the faces of rolls Q and R are even, they reduce the sides of bar L′ equally, as shown at *b′ b′*, figs. 13 and 14. The flanges or sides *x x* of the grooved roll R retain the bar part L′ from expanding in depth while the sides are being reduced to the form shown in fig. 13 at *b′ b′*. The front edges or faces of the flanges *x x* of roll R are cut back or inclined, as shown at *c′*, to prevent their striking upon the projections *j* and *k* of bar L, when the sides of the part L′ are first acted upon by rolls Q and R. After the part L′ has been subjected to the action of rolls Q and R, it is run from table 7, between the grooved segment-rolls S and T, and the end shrunk or rolled down to a taper form, as shown at L″, fig. 14, when bar L is cut off on line O P, and the part U, which is cut off with the part L′, is worked into the proper form to form the head of the wrench. The ordinary mode is to forge it out by hand in a suitable die, but I form the head by rolling, as set forth in my application for a patent for an improved machine for heading wrench-bars. With the rolls arranged conveniently, as shown in the drawings, the end of bar L may be rolled or reduced to the form shown in figs. 13 and 14 at one heat.

It will be observed that the flanges or sides of all the grooved segmental rolls used for reducing the bar in depth project somewhat beyond the ends of the segments, as shown at 9, figs. 4, 5, 6, and 7. The object of this peculiar construction is quite important. For instance, suppose the flanges or sides *m* of the segmental roll K were flush or even with the end *e* of the roll, instead of projecting forward of the same, as shown in the drawings. The result would be that when bar L was acted upon by rolls J and K, the metal would be forced out laterally by the face of the flanges or sides *m m*, and would be sheared or cut off by the outer edges of said flanges, while at the same time there would be great danger of the flanges catching so much of the metal as to displace the bar. The same remarks and explanations are alike applicable to the rolls shown in figs. 4, 6, and 7.

As it may be desirable, during the operation, to bring the bar back to the exact thickness, in order to correct any slight bulging or lateral expansion, a set of evening rolls, V W, are employed, which are so set that, by running the bar flatwise over table 2, between said rolls, the bar is rolled down to its original thickness. It will be observed that provision is made whereby the same amount of metal is rolled down into the part L′ at

each operation, and consequently, by a few trials, the stops can be so adjusted as to prevent all waste of metal. The flanges or sides of the segmental-groove rolls, figs. 4, 5, 6, 7, and 8, are made a little flaring, that is, the sides incline from each other as they extend outward from the rolls. The segmental-tongued rolls are so constructed and arranged that their outer edges just fill the space between the sides or flanges of their respective grooved rolls. By this mode of construction the tongues and sides of the rolls do not chafe or rub each other, while the metal bar is entered and delivered from between the flanges in an easier and more expeditious manner. All catching or binding of the bar is obviated. In case the faces of any set of rolls become worn off they can be cut back by a cold chisel, when they become as effective as when new. The shafts E and F are retained in their proper and relative positions longitudinally by the use of the grooved roll 15, which is keyed to shaft F, and the tongued roll 16, keyed to shaft E, said rolls running together, as indicated in the drawings.

By my improvements bars for wrenches can be rolled from the end of a bar of metal having sufficient depth to form the head, while at the same time the metal acted upon is thrown into the desirable position as respects the main bar, thereby enabling the head to be so made as to project all on one side or partly on both sides. It will also be observed that the operation is such that the surplus metal, if any, when the head is completed, will be upon one side and at the point which forms the thin portion of lip of the stationary jaw. All of the tables 1, 2, 3, 4, 5, 6, and 7 have side guides 17, to direct the bar between the rolls.

Having described my improved machine for rolling wrench-bars and other similar articles which require heads or projections, as described, what I claim as new, and of my invention, and desire to secure by Letters Patent, is—

1. The herein-described combination of machinery for rolling wrench-bars and other similar articles, organized substantially as herein shown and described, for operation as set forth.

2. The combination, with the tongued segment-roll H and grooved segment-roll I, of the stationary stop *f*, and table 1, all constructed and arranged substantially as and for the purposes set forth.

3. The combination of the notched segment-roll J and flanged segment-roll K, constructed and arranged for operation as described.

4. The combination, with the notched segment-roll J, and flanged segment-roll K, of the table 3, and stationary stop *h*, substantially as and for the purposes set forth.

5. The combination, with the notched segment-roll M, and flanged segment-roll N, of table 4, and adjustable stop *s*, substantially as and for the purposes set forth.

6. The combination, with the tongued segment-roll Q, and the grooved segment-roll R, having the flanges *x x* cut or inclined, as shown at *c'* of the table 6, and adjustable stop *v*, for the purposes stated.

T. C. RICE.

Witnesses:

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D. L. MILLER.