

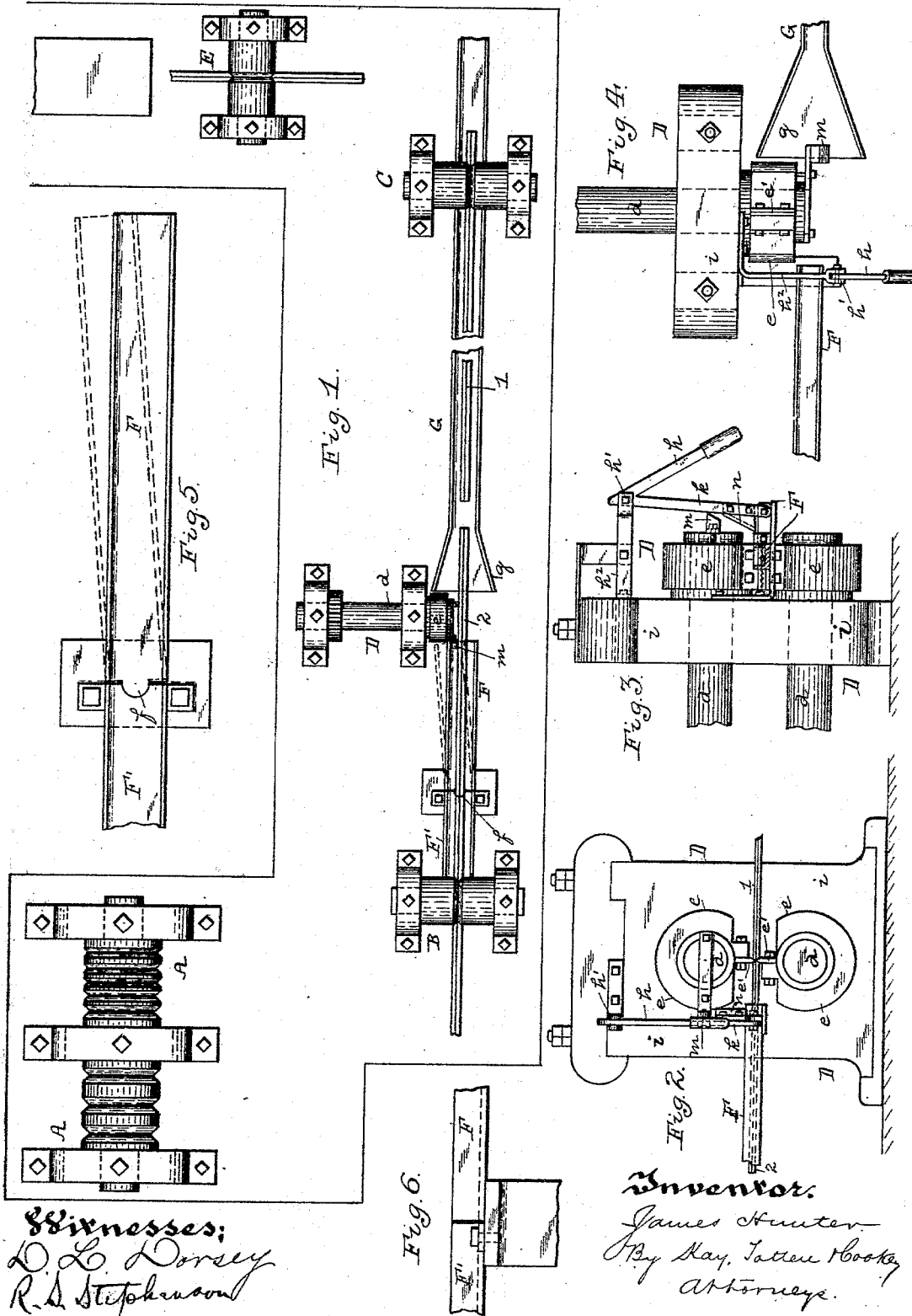
(No Model.)

J. HUNTER.

METHOD OF AND APPARATUS FOR ROLLING IRON BARS, &c.

No. 511,147.

Patented Dec. 19, 1893.



UNITED STATES PATENT OFFICE.

JAMES HUNTER, OF PITTSBURG, PENNSYLVANIA.

METHOD OF AND APPARATUS FOR ROLLING IRON BARS, &c.

SPECIFICATION forming part of Letters Patent No. 511,147, dated December 19, 1893.

Application filed June 22, 1892. Serial No. 437,624. (No model.)

To all whom it may concern:

Be it known that I, JAMES HUNTER, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of and Apparatus for Rolling Iron Bars or Like Sections; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the rolling of iron bars or like sections, its object being to provide for the formation of two or more lengths of bar from a single billet or pile in course of reduction of such a billet to bar form. It is a well-known fact that while in many rolling mill operations it would be desirable, instead of rolling a billet or pile into the full length which can be formed from the same, to roll it into several shorter lengths, for the reason that the long length occupies so much space, while for the mass of uses to which it is put there is no advantage in forming such length of bar, and the only reasons for forming it are economy in heating, rolling, and the necessary "work" to which the metal is to be subjected; it being found that the metal can be reduced at that particular heat from one general section to another, and being desirable to take advantage of such reduction. Another advantage in forming two or more lengths out of the same billet would be the more compact rolling mechanism and the overcoming of the necessity of gearing rolls to run at special speeds in continuous mills.

To these ends my invention therefore consists, generally stated, in forming two or more lengths of bar from a single billet or pile by reducing the billet within suitable rolls, and, while the bar is engaged and being reduced by two sets of rolls in line with the other, cutting the same between said rolls; whereby the forward part of the bar is carried through the delivery rolls of the set and the remainder of the bar is fed to said delivery rolls by the rolls in front of the shearing mechanism, and, as a result, a large billet or pile can be reduced to two or more lengths of bar of much smaller section than can be produced by the ordinary rolling of the same down to a single length of bar and much more rapidly, and the space necessary for the rolling operation is greatly reduced.

It also consists in certain other improvements in the rolling of the bar and the mechanism for practicing the invention, which mechanism consists, generally stated, in combining with the set of rolls a rotary shear forward of the same and traveling at approximately the same speed, and so adapted to shear the bar while it is being moved longitudinally by the rolls; such shearing mechanism being preferably placed at one side of the course of the bar and mechanism being provided for forcing the bar into the course of the shears.

To enable others skilled in the art to practice my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a plan view showing the rolls and shears suitable for practicing the invention. Fig. 2 is a face view of the shears. Fig. 3 is a side view of the shears. Fig. 4 is a detail plan. Fig. 5 is an enlarged plan view of the movable guide, and Fig. 6 is a side view of the same.

Like letters and numerals of reference indicate like parts in each.

My invention can be practiced by the mechanism herein described which has been found by practical operation to be efficient for the purpose, but it is to be understood that any suitable mechanism may be employed.

In the drawings the rolls A are the ordinary billet rolls by which the billet or pile may be reduced to approximately the size of bar desired, or to any section in the course of formation of the bar, and do not require any special description. Instead of such rolls a continuous mill may, of course, be employed, if desirable. The rolls B and the rolls C form parts of the rolling mill in which the bar is cut into lengths, the two sets of rolls being in line with each other; and the shears D are placed between the said two sets of rolls, it being understood that the continuous mill may have as many sets of rolls in line with each other as desirable. At one side of the delivery end of the continuous mill, I may, if desirable, place a set of finishing rolls as at E, to which the different lengths of bar formed from the billet or pile are fed to be brought to the exact size required. Between the rolls B and C are suit-

able guides, and the bar is adapted to pass along the same so as to be fed into the rolls C before it passes entirely through the rolls E, and the shears D are placed to operate between the two sets of rolls. In the preferable construction the shears D are out of line with the rolls B C so that the bar may be directed by the guides past the shears and any length of continuous bar desired may be rolled. The shears, however, are so located that a slight deflection of the bar brings it into the course of the shears, so that it may be cut into lengths as above stated. For this purpose I employ a movable guide F which operates in connection with the fixed guide G, so that when the bar is passing in its usual course the two guides are in line with each other, but when the bar is to be cut the guide F may be forced over toward the shears, and after shearing the bar be guided into the stationary guide by the enlarged or flaring end *g* of said stationary guide. I also prefer to employ rotary shears traveling at approximately the same speed as the rolls F and having therein suitable cutters so that the bar is severed into lengths without its speed being checked which would either lead to the buckling of the same or upsetting of the end in such way that it would not feed properly to the next pass. In such rotary shears D the rotating shafts *d d* carry heads *e* provided with knives or cutters *e'*, which will act to sever the bar as it is forced between the heads or collars *e* carrying said cutters. It will be understood, however, that the shears for cutting the bar in lengths may be of any suitable form, whether rotary, or otherwise, and whether mounted on horizontal or other axes. As illustrated in the drawings the movable guide F is pivoted at *f* to the guide F', being pivoted in any suitable way, and the movable guide F being simply a box of the proper section and shown in Fig. 3, which can be swung over by any suitable device, that illustrated in the drawings being the hand lever *h* which is mounted at *h'* to the bracket *h²* extending out from the housing *i* of the shears; the lever having the arm *k* which extends down to and is connected to the box or movable guide F, so that when the lever *h* is pushed down through its arm *k* it will force the guide F over to one side and cause it to carry the bar into the course of the rotary shears, so that the bar will be cut thereby, the length 1 of the bar being drawn through the guide G by the rolls C, while the second length 2 enters the flaring end *g* of the guide G and is directed back into the guide and passes through the same into the rolls C, being fed longitudinally through said guide G by the rolls B. It is evident that the difficulty of such construction would be the liability of the bar being cut into short lengths corresponding with its movement during one revolution of the box F by the operator. This I have overcome, however, by providing the upper shear body with a

knocker *m* which strikes against the wedge or inclined face *n* of the arm *k* of the lever, and by traveling over such inclined face forces the guide box F back to its normal position, so automatically drawing the bar out of the course of the shears, the result of which is that as the knocker *m* strikes the inclined face *n* before another revolution of the shears is made, the bar is drawn out of the course of the shears and can only be cut once, unless the lever *h* is again depressed.

In practicing my invention the billet or pile is brought to the proper heat in a suitable furnace and is then fed to reducing rolls such as A, and if such rolls are not in line and do not form part of the continuous mill, the bar is then carried to and fed into the continuous mill, such as into the rolls B, it being well known that it can be fed to those rolls before it passes out of the rolls A. The metal is acted upon by the rolls B and fed longitudinally first through the guide piece F' and then through the movable guide F into the guide G, and is directed thereby into the rolls C. The bar is permitted to travel in this course for as great a length as desired, its forward end, if desired, being fed into the finishing rolls E. When, however, it is desired to cut it into lengths, the operator depresses the lever *h*, forcing the movable guide F out of its usual course and carrying with it the highly heated and flexible bar which is carried into the course of the shears D, and the knives *e'* of the shears cut the same into lengths as illustrated in Fig. 2, the result of which is that the length 1 is carried on by the rolls C and is followed by the length 2 which enters the flaring guide portion *g* of the guide G and is directed into said guide, and then as the knocker arm *m* strikes against the inclined face *n* it forces the guide F back into its normal position, drawing the bar out of the course of the shears and permitting it to feed forward into the rolls C. The rolls C are preferably driven at a somewhat increased speed over the rolls B, so that the length 1 is fed out of said rolls before the length 2 enters the rolls it may again be operated upon by the shears in the manner above described, the bar being cut into as many lengths as desirable, and the result being that instead of requiring a mill floor of great length to receive the different bars, short lengths of bar may be formed from the single billet or pile, and such separate and short lengths when finished be stored in much smaller space, thus leading to a very great saving in the size required for the mill and giving lengths which are convenient to handle. After the rolling operation these lengths may either be fed to other machines, such as spike, bolt or rivet machines, or may be left to cool and utilized either for merchant bar or other suitable purposes.

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

1. The herein-described method of forming two or more lengths of bar from a single billet or pile, consisting in reducing the billet within suitable rolls, and while the bar is engaged by two sets of rolls in line with each other, cutting the same between said rolls, and feeding the second length forward by the action of the first set of rolls into the second set of rolls, substantially as and for the purposes set forth.

2. The herein described method of forming two or more lengths of bar from a single billet or pile, consisting in reducing the billet within suitable rolls and thereby feeding it forward into another set of rolls in line therewith, and while the bar is engaged by the two sets of rolls moving said bar sidewise out of its course between shears to cut it into lengths, bringing the bar back into its original course and feeding the second length forward by the first set of rolls into the second set of rolls, substantially as and for the purposes set forth.

3. The herein-described method of forming two or more lengths of bar from a single billet or pile, consisting in reducing the billet within suitable rolls, and, while the bar is engaged by two sets of said reducing rolls in line with each other, forcing it out of its normal course between shears to cut it into lengths, and then feeding the second length forward by the first set of rolls and directing it back into its normal course, and feeding it into the second set of rolls, substantially as and for the purposes set forth.

4. In rolling mills, the combination of a set of rolls, power driven rotary shears forward of the same traveling at approximately the same speed, and adapted to shear the bar when moved longitudinally by the rolls, substantially as and for the purposes set forth.

5. In rolling mills, the combination of two sets of metal reducing rolls in line with each other, guides between said rolls, and rotary shears between said sets of rolls and adapted to move in the same direction with the bar and so shear the bar without buckling it when it is being moved longitudinally by the rolls, substantially as set forth.

6. In rolling mills, the combination of two sets of metal reducing rolls, and shears placed between them and at one side of the line in which the metal is fed between the rolls, substantially as and for the purposes set forth.

7. In rolling mills, the combination of a set of metal reducing rolls, a guide for directing the course of the metal forward, and shears placed at one side of the normal line in which the metal is fed by the rolls, part of said guide being movable to carry the bar into the course of the shears, substantially as and for the purposes set forth.

8. In rolling mills, the combination of two sets of metal reducing rolls in line with each other, shears at one side of such line, a movable guide to carry the bar into the course of the shears, and a guide to direct the bar into the second set of rolls, substantially as and for the purposes set forth.

9. In rolling mills, the combination of two sets of metal reducing rolls in line with each other, shears at one side of such line, a movable guide to carry the bar into the course of the shears, and a guide to direct the bar into the second set of rolls, said latter guide having a flaring entrance end, substantially as and for the purposes set forth.

10. In rolling mills, the combination of a set of rolls, shears at one side of the course of the bar, a movable guide to carry the bar into the course of the shears, said guide having an inclined face, and the shears having a knocker to force the same out of the course of the shears, and withdrawing mechanism to draw the guide out of the course of the shears, substantially as and for the purposes set forth.

11. In rolling mills, the combination of a set of rolls, shears at one side of the course of the bar, a movable guide to carry the bar into the course of the shears, said guide having an inclined face, and the shears having a knocker to force the same out of the course of the shears, substantially as and for the purposes set forth.

12. The combination of the rotary shears having the shearing knives and the knocker arm *m*, the movable guide having lever mechanism connected thereto, and the inclined face *n* with which the knocker arm engages, substantially as and for the purposes set forth.

In testimony whereof I, the said JAMES HUNTER, have hereunto set my hand.

JAMES HUNTER.

Witnesses:

J. N. COOKE,
JAMES I. KAY.