(No Model.)

W. MORRIS.

APPARATUS FOR ROLLING WIRE RODS.

No. 291,923. Patented Jan. 15, 1884.

Fig. 2.

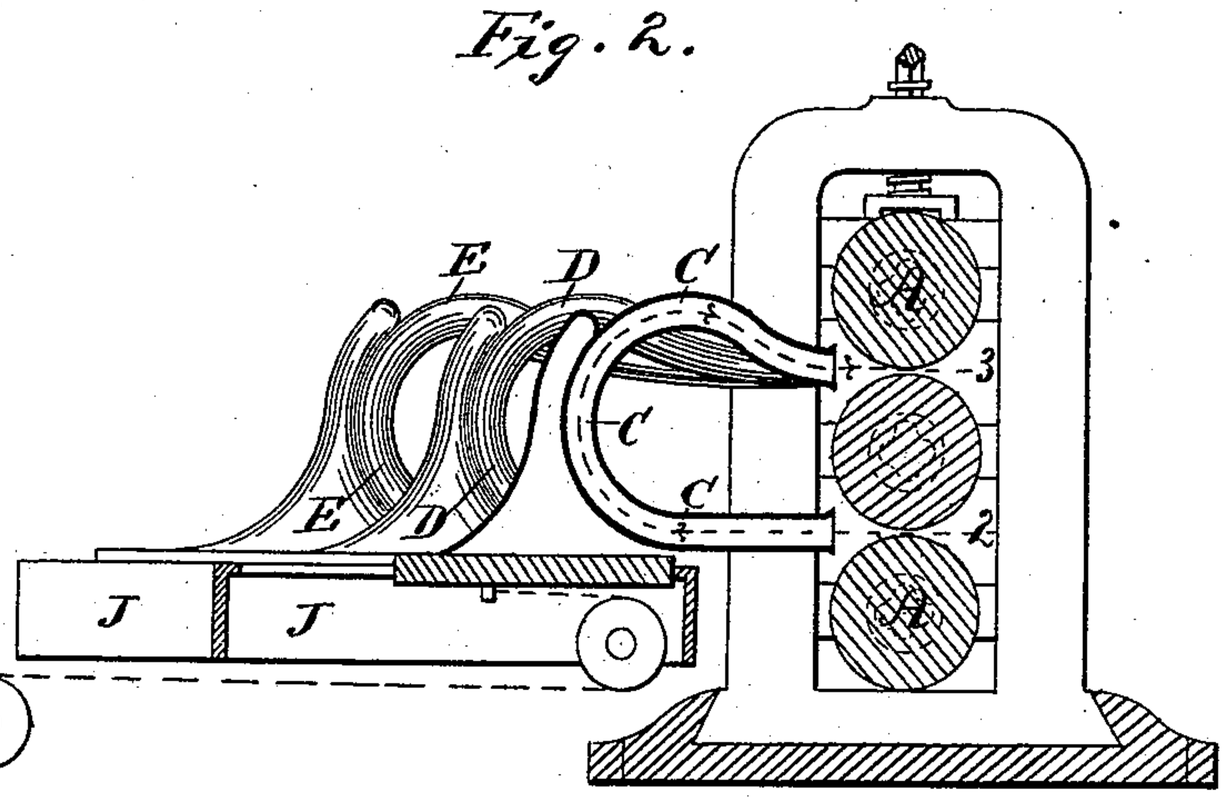


Fig. 3.

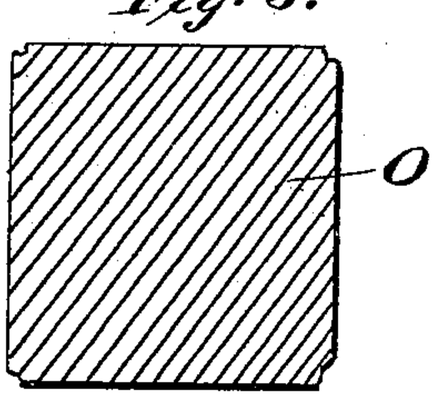
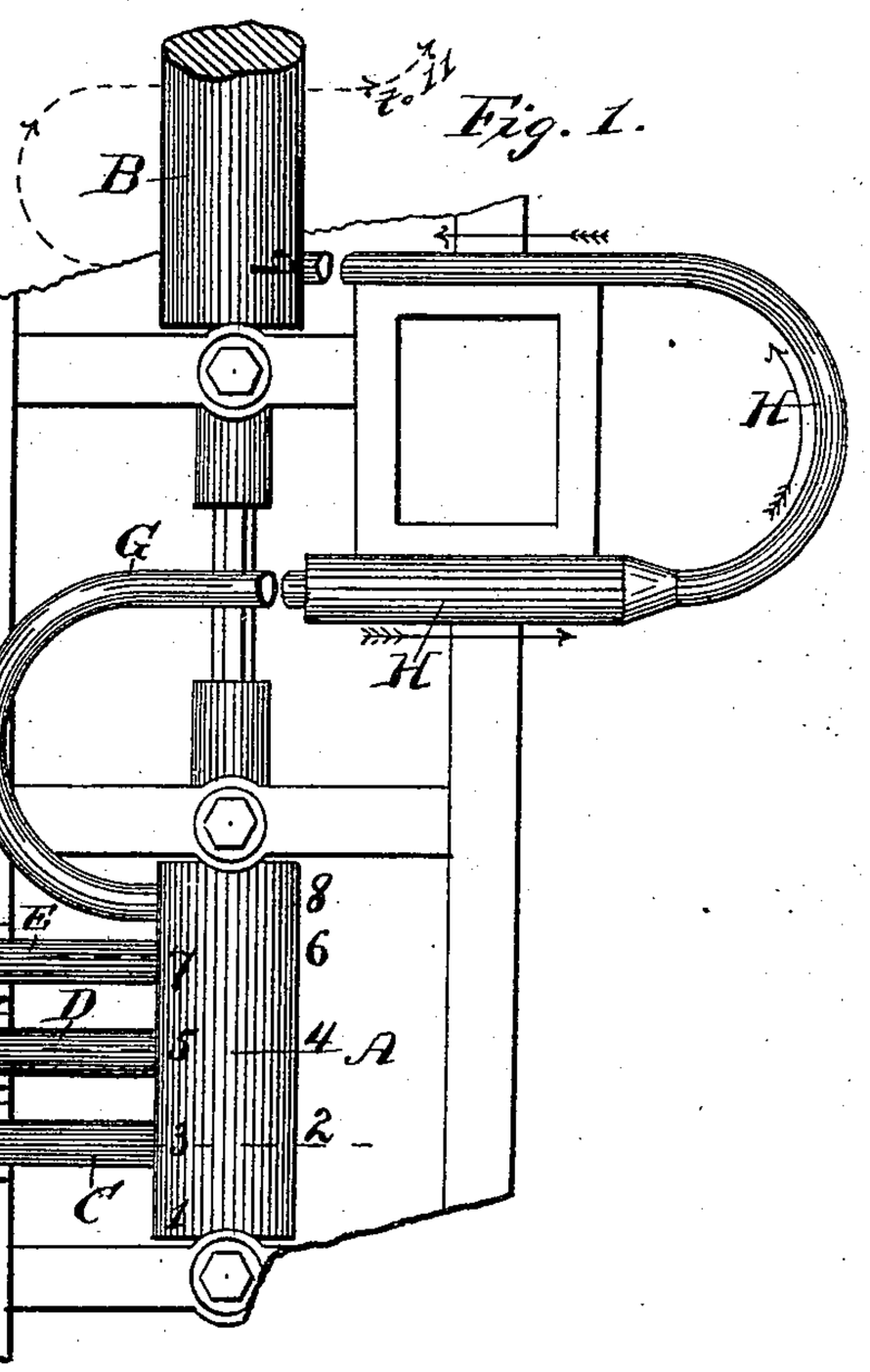


Fig. 4.

Fig. 5.

Fig. 1.



WITNESSES

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WILLIAM MORRIS, OF OAKENGATES, COUNTY OF SALOP, ENGLAND.

APPARATUS FOR ROLLING WIRE RODS.

SPECIFICATION forming part of Letters Patent No. 291,923, dated January 15, 1884.

Application filed July 17, 1883. (No model.) Patented in England September 5, 1882, No. 4,216.

To all whom it may concern:

Be it known that I, WILLIAM MORRIS, of Oakengates, in the county of Salop, England, have invented certain new and useful Improvements in Apparatus for Rolling Wire Rods, of which the following is a specification.

My invention has for its object improvements in apparatus for rolling wire rods, which enables me to manufacture such rods from the billets with greater speed and less waste, and less manual labor, and with less expenditure of fuel than has hitherto been possible. The quality of the rods is also superior to those made by the old process of manufacture.

The billets for wire rods are usually run through sets of three rolls. The billet, passing through the first hole in, say, the lower row of holes, runs out in a straight line, and the back end of this straight rod is then entered into, say, the upper holes, and so run back again, and so on, being reversed each time until it is sufficiently extended and reduced in cross-section to allow its end to be bent or turned up by the attendant roller into the next row of holes, after which the rolling is continuous in one direction from hole to hole. Various attempts have been made to roll billets continuously—as, for instance, by several sets of rolls placed one after the other, the rod passing forward in practically a straight line. Then, again, a bent tube has been used in combination with four rolls—a lower and upper pair—the tube turning the rod around as it passes through and into the second set; but in this case the rolls have to be turned and adjusted very nicely to take up the slack. Indeed, much trouble has been experienced in attempts to take up the slack in continuous rolling. Guide-tubes have also been mounted on carriages and bent to convey the bar or billet from one pair of dies to another; but such tubes and carriages have not been provided with weights or other devices to automatically restore them to their normal position.

Now, by my apparatus, the above difficulties are overcome without either a fourth roll to the set or extra sets of rolls, all that is necessary being the attachment of the apparatus to the ordinary wire-rod mills. This I accomplish in the following manner: Taking the billet to have entered at one of the lower row of holes—*i. e.*, between the bottom and middle roll—it immediately enters a tube which is telescoped into a bent tube. This bent tube turns the rod and points it into a bent tube in the upper row—*i. e.*, between the middle and top roll. The bent tube is connected with friction wheels or slides in such a manner that it is perfectly free to move backward or forward. Indeed, it is quite free to reciprocate so as to perfectly accommodate itself to varying lengths of rod outside the rolls at any time. This may, of course, be effected by various mechanical contrivances—such as passing chains over pulleys with counter-weights, hydraulic fusee, or steam, springs, or other device may be used. It is of course necessary that the tube should offer sufficient resistance to bend the rod round rather than be pushed back by its forward motion. The weights or springs are necessary to bring the tube back to its proper place; but, generally, balance-weights under the level of the ground would be found most convenient. Friction-rollers may be used, when necessary, in various positions toward or at the back end of the tube, which would induce the rod to bend more easily round the curve.

In order that my invention may be more clearly understood and better carried into practice, I have appended hereunto a sheet of drawings, showing the application of my invention in part to an existing train of three-high rolls.

Figure 1 is a plan of the rolls, and Fig. 2 is an end elevation of the same. The guide-tubes C, D, and E are shown as applied to one side of the rolls only, which is sufficient, when the action is understood, to enable any person acquainted with the trade to apply them indefinitely to the other side and to other trains of similar rolls. I have not in any case shown the grooves in the rolls, because that is unnecessary for the purpose of explanation.

I will explain my apparatus in its order, while following out the rolling of billet O, Fig. 3. The billet O is taken by hand and entered at 1 in the bolting-rolls, through which it passes, and is returned by the attendant through the bottom rolls at 2, when it passes round the pipe C and returns through the upper rolls at 3, when it is again

entered below at 4, passing through and around the pipe D, through the top at 5, and back through the bottom at 6, and around the pipe E, and through the top at 7, then into the bottom rolls at 8, when it leaves the bolting-rolls. Passing round the bent pipe G, it enters the telescopic pipe H. Passing round in the direction of the arrows, it enters the next three-high rolls at 9, which are commonly called the "first three-high rolls." It is turned either by hand or tube round and through 10. It then passes along another telescopic tube similar to H, and into the first pair of two-high rolls, as indicated "to 11," and so on through several sets of two-high rolls until it is completed. In order that some idea may be formed of the reduction in the original shape, I have shown in Fig. 4 the shape of the rod as it would be after passing hole 11 in the first two-high rolls. It would then pass through another hole, 12, which would be in the next second high rolls, when its section would be approximately that shown by Fig. 5.

The action of the pipes is somewhat as follows: When the rod enters at 2 and passes around the pipe C and into the hole 3, immediately the reduction commences in the rod at 3. The rod, passing around the inside of pipe C, is extended and carries the pipe C back upon its slides J, lifting its balance-weight K as it runs outward. The same action goes on with the pipe D and E; but immediately the rod leaves the pipe or pipes, the carriages or slides and pipes are returned back to their former position by the balance-weight K; or other equivalent device may be used for the purpose. When the rod passes around G and around H into hole 9, it is again reduced in section and the back end becomes lengthened in the tube H, which also slides back upon a suitable carriage and slides, thus allowing the rod to extend itself sufficiently, and yet be protected, over a considerable portion of its length.

The pipes C, D, and E may be telescoped into a bottom piece, or a bottom and top piece, so as to still cover the hot rod when the pipes are run out upon their carriages; or they may be used, as shown, without telescoping. The pipe C would require a heavier weight K, or spring, or other equivalent resistance, than would be needful to the pipes farther down the train, which is only natural, because, as the billet became reduced in section into the rod, less power would be required to turn the end of the rod round the various pipes. The resistance of the pipes by weights or springs would therefore be proportionate to the size of the billet and the section and strength of the rod at each particular pipe, which is easily managed, especially in the case of weights, as several may be used to make up the weight K.

It will be at once evident that these controlling sliding tubes may be attached to a wire-rod mill to a considerable extent, so that the heat of a billet may be utilized to the utmost degree, and the rod rolled with much less reversal of the grain of the metal—*i. e.*, entirely or almost entirely in one direction—with simplicity and freedom. Thus buckling and breaking is in a greater measure avoided, and the fiber of the iron is not impaired, and greater uniformity and economy is obtained. Besides, larger and heavier billets may be rolled than with the old method, thus producing longer rods, which is very desirable, and less skilled labor is required, and less time will be lost, and the rods will thus be hotter, and softer, and sounder, besides the saving in avoiding a considerable amount of waste.

I do not of course confine the use of these controlling sliding guide-tubes to wire-rod rolling, as they may be used for the manufacture of hoops, small flats, rounds, squares, and wire rods, and other sections, from puddled billets. Neither do I confine myself to any particular kinds of metals to be rolled, as steel, iron, or other metal may be rolled according to my invention with similar advantages to those enumerated above for wire-rod rolling.

I would also here remark that though my sliding tubes are only shown as applied to three-high rolls, considerable advantages are to be obtained by sliding tubes when applied to four-high rolls, though I consider that generally this is unnecessary, and therefore waste of capital. The fact is, that they will either wholly take up the slack, or they will partly do so in conjunction with rolls of different diameter.

What I claim is—

In combination with a series of rolls, a series of guide-tubes, a series of movable carriages on which said tubes are mounted, and a series of weights, cords, and pulleys which operate to automatically restore the respective carriages and tubes to their respective positions in proximity to the rolls, substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in the presence of two witnesses.

WILLIAM MORRIS.

Witnesses:
GEORGE PRICE,
GEORGE BARKER.