

(No Model.)

4 Sheets—Sheet 1.

V. E. EDWARDS.

APPARATUS FOR STRAIGHTENING AND COOLING METAL RODS.

No. 585,262.

Patented June 29, 1897.

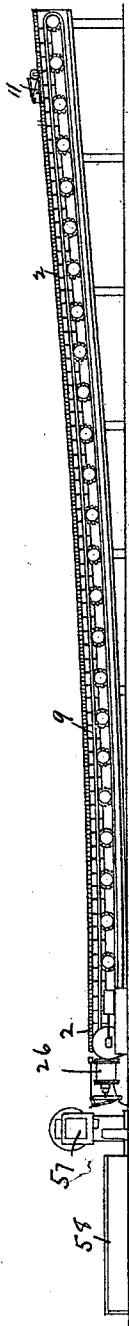


Fig. 2.

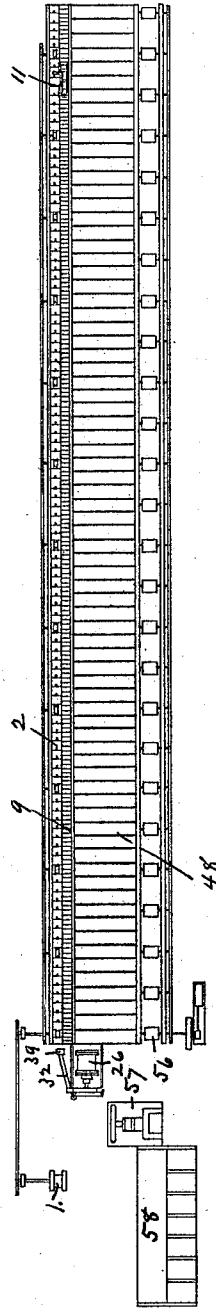


Fig. 1.

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(No Model.)

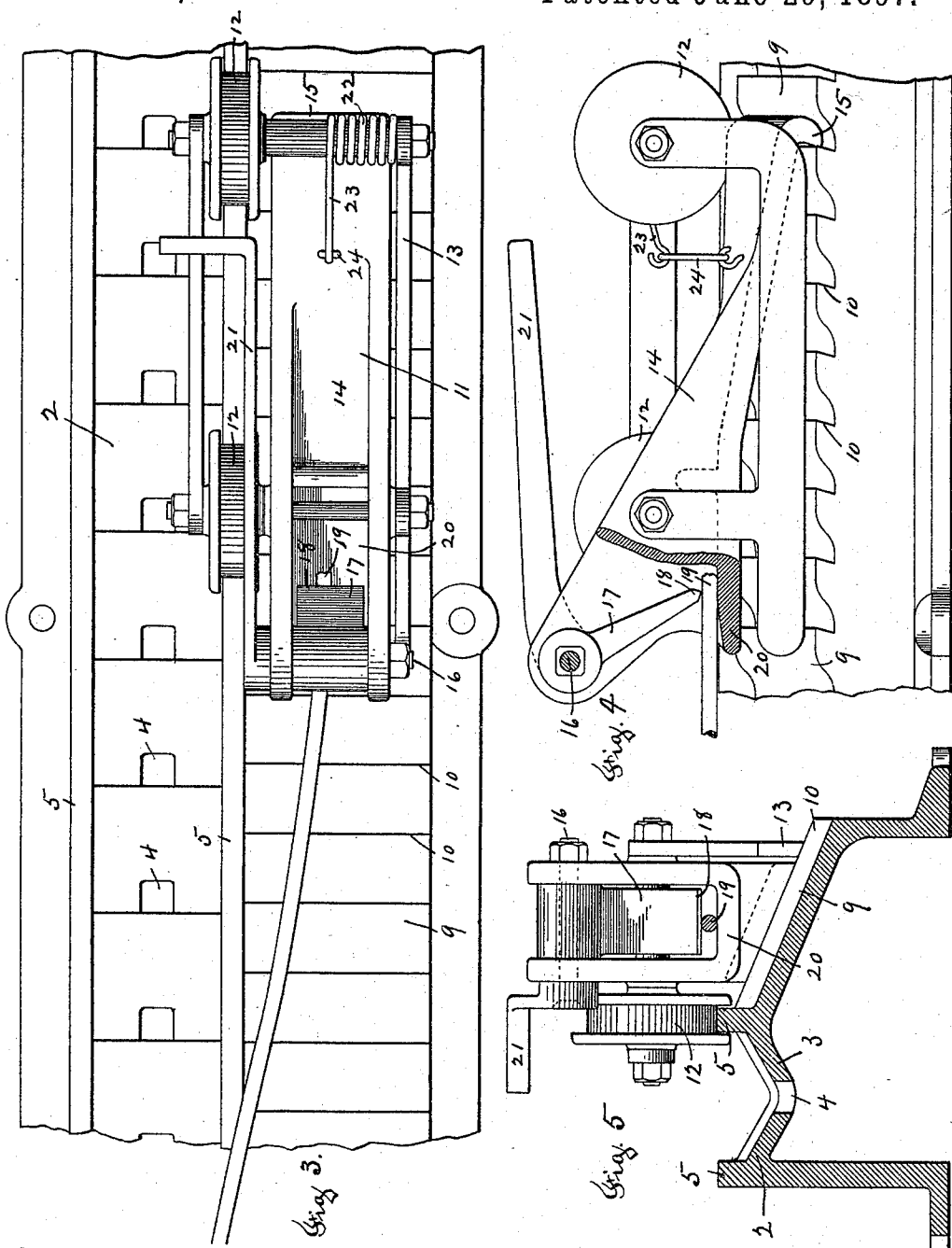
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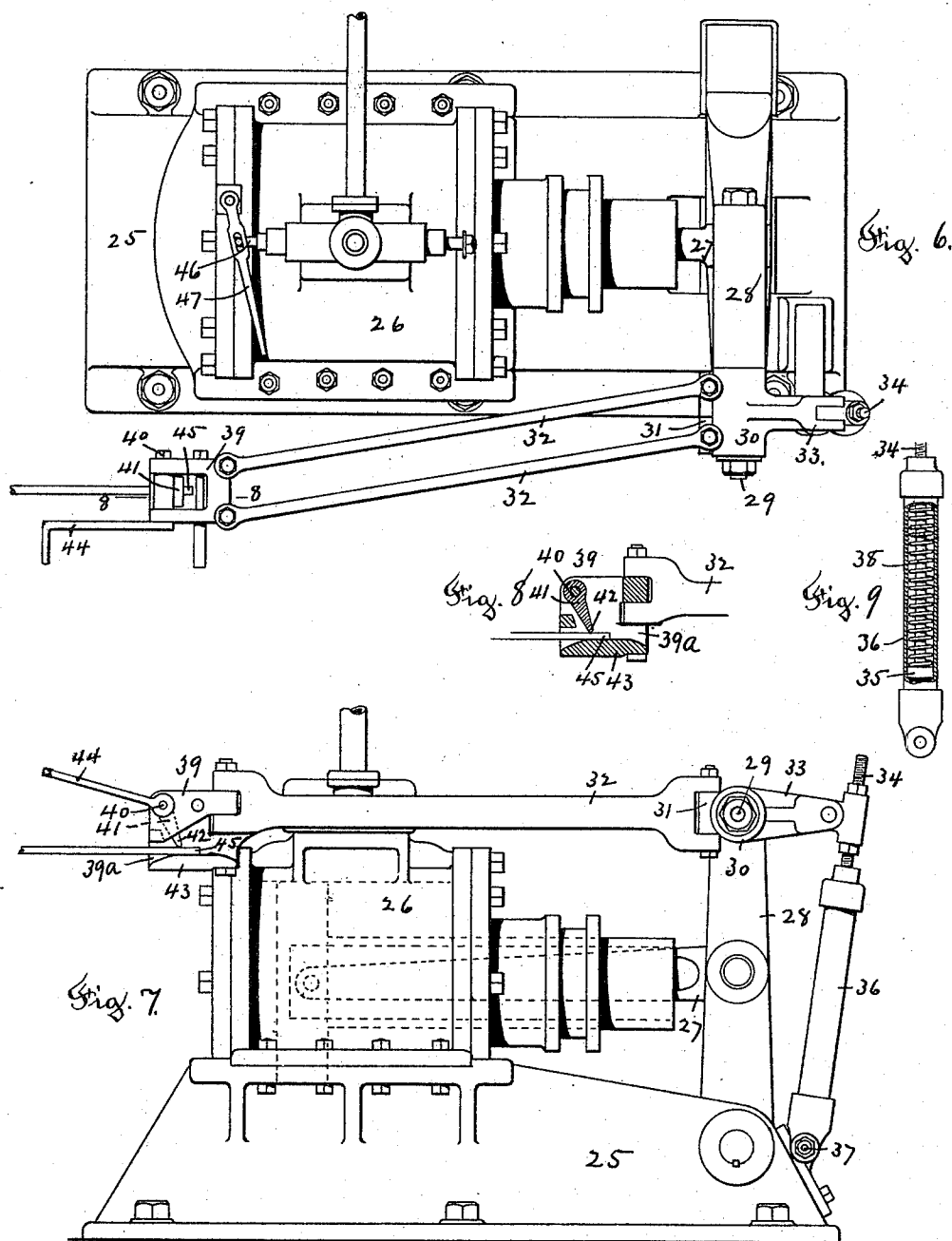
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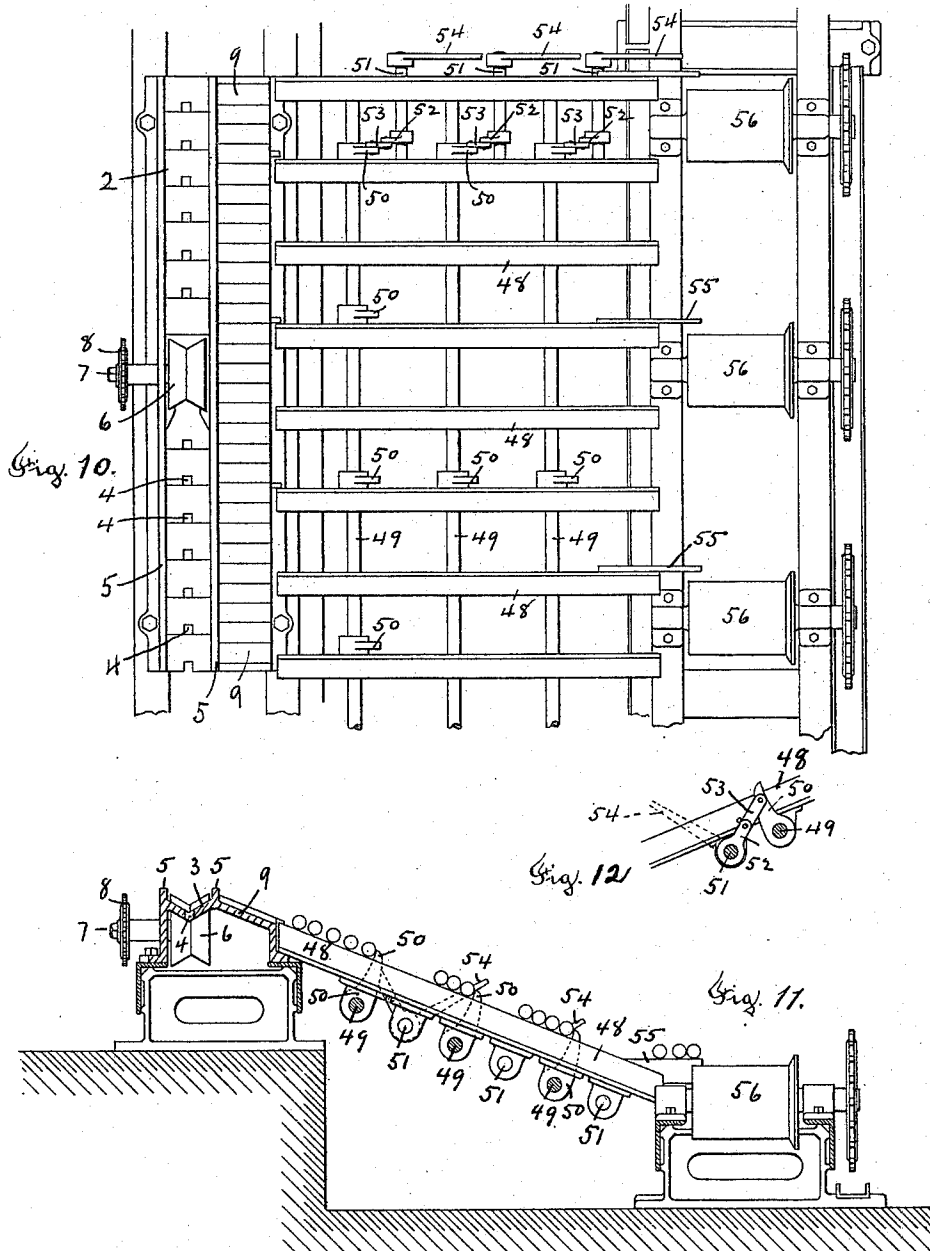
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR STRAIGHTENING AND COOLING METAL RODS.

SPECIFICATION forming part of Letters Patent No. 585,262, dated June 29, 1897.

Application filed May 4, 1896. Serial No. 590,126. (No model.)

To all whom it may concern:

Be it known that I, VICTOR E. EDWARDS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in an Apparatus for Straightening and Cooling Metal Rods, of which the following is a specification, accompanied by drawings forming a part of the same, in which—

Figure 1 represents a plan view of the apparatus embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a plan view, on a larger scale, of a portion of the cooling-table and of the adjustable carriage provided with gripping mechanism by which one end of the rod is held. Fig. 4 is a side view of the adjustable carriage and gripping mechanism. Fig. 5 is a end view of the adjustable carriage and gripping mechanism, showing the cooling-bed in transverse sectional view. Fig. 6 is a top view of the mechanism for applying a strain to the rod for the purpose of straightening the same. Fig. 7 is a side elevation of the apparatus shown in plan view in Fig. 6. Fig. 8 is a vertical sectional view of the gripping mechanism shown on line 8 8, Fig. 6. Fig. 9 is a detached view of the mechanism for counterbalancing the weight of the gripping mechanism and parallel bars by which the same is supported, a portion being shown in sectional view in order to show the inclosed spiral spring. Fig. 10 is a top view of a portion of the cooling-bed, showing the inclined skids upon which the rods are held during the process of cooling, together with the rocking shafts and radial arms which are adapted to hold the rods at different positions upon the inclined skids. Fig. 11 is an end view of the parts represented in Fig. 10, and Fig. 12 is a detached view of the mechanism for actuating the rocking shafts and releasing the rods.

Similar numerals refer to similar parts in the different figures.

My invention relates to certain improvements in an apparatus for straightening rods while in a heated condition as delivered from the finishing-rolls of a rolling-mill and supporting the same after they have been

straightened and during the process of cooling; and it consists in the construction and arrangement of the several parts, as hereinafter described, and set forth in the annexed claims.

Referring to the drawings, 1, Fig. 1, denotes a pair of finishing-rolls from which the rod is delivered, said rolls being in alinement with the trough 2, into which the rod is projected by the action of the rolls 1. The trough 2 is shown in cross-section in Figs. 5 and 11 and is provided with an angular bottom 3, provided with openings 4, to allow the scale from the cooling-rod to fall, and having the vertical side walls 5 5, between which the forward movement of the rod is restrained.

At intervals along the trough 2 are angular feed-rolls 6, having their periphery extending slightly above the bottom of the trough and mounted upon the spindles 7, which are journaled in suitable bearings and carry sprocket-wheels 8, by means of which the feed-rolls 6 are positively rotated by a chain-belt connection with the finishing-rolls 1 or other source of power. At one side of the trough is an inclined plate 9, preferably integral with the trough 2 and provided with a series of ratchet-teeth 10. Supported above the inclined plate 9 is a movable carriage 11, provided on one side with the trucks 12 12, adapted to run along one of the vertical side walls 5. The opposite side of the carriage is provided with a shoe 13, resting on and adapted to slide along upon the ratchet-teeth 10.

Pivotaly mounted upon the carriage 11 is a tilting frame 14, having one end provided with a hook 15, adapted to engage the ratchet-teeth 10, and in the opposite end of the tilting frame I place a rocking spindle 16, to which is attached the radial finger 17, having its lower end pointed at 18, said radial finger being of the proper length to engage the end of the rod 19, resting upon the web 20 of the tilting frame 14. To the end of the rocking spindle 16 I attach a hand-lever 21, extending rearward and parallel with the hooked end 15 of the tilting frame. The hooked end 15 of the tilting frame is lifted out of engagement with the ratchet-teeth 10 by means of a coiled torsional spring 22, sup-

ported by the rigid framework of the carriage and having one end 23 extending over the tilting frame and connected thereto by means of a link 24, the tension of the coiled spring 23 being just sufficient to hold the hooked end 15 of the tilting frame normally disengaged from the ratchet-teeth 10.

The trough 2 is placed in an inclined position longitudinally, and at the lower end of the trough I place the mechanism for exerting a longitudinal strain upon the rod for the purpose of straightening it.

The straightening mechanism consists of a framework 25, upon which is mounted a steam or hydraulic cylinder 26, containing a reciprocating piston connected by its piston-rod 27 with a lever 28, pivoted at its lower end to the frame 25 and carrying at its upper end a stud 29, upon which is mounted a sleeve 30, provided on one side with a lug 31, to which is pivoted the parallel arms 32 32, and upon the opposite side of the sleeve is a radial arm 33, pivotally connected with a screw-threaded rod 34, carrying a piston 35 and inclosed in a barrel 36, which is pivoted at 37 to the frame 25. Inclosed within the barrel 36 and above the piston 35 is a spiral spring 38, with its tension exerted upon the piston 35 to press it downward, so the force of the spring 38 will act as a counterbalance to the weight of the parallel arms 32 32.

The free ends of the parallel arms 32 32 are pivotally connected with the gripping-block 39, in which is pivoted a spindle 40, carrying a finger 41, having its end pointed at 42 and adapted to engage a rod inserted between it and a table integral with the gripping-block 39. To the spindle 40 is attached a hand-lever 44, by which the spindle is rocked and the pointed end of the finger 41 carried into engagement with the end of the rod 45, resting upon a table 43, thereby holding the rod from longitudinal movement. The gripping-block 39 is pivotally connected to the outer ends of the parallel arms 32 32 and is provided with a vertically-depending wall 39^a, from one side of which projects the horizontal table 43, providing an open space upon one side and above the table, thereby allowing the rod which extends from the finishing-roll to the trough 2 to be entered between the table 43 and the radial finger 41 by the lateral movement of the gripping-block in bringing it into alinement with the trough 2, thereby allowing the rod to be inclosed within the gripping-block 39 while it is in motion. Steam or water under pressure is admitted to the cylinder 26 in the usual manner by the reciprocating movement of a valve-stem 46, which is moved by a hand-lever 47.

A rod is delivered from the finishing-rolls 1 and conducted into the trough 2. The movement of the rod up the inclined trough 2 is aided by the positively-driven feed-rolls 6. As the rod runs clear of the finishing-rolls its motion is continued by the action of the positively-driven feed-rolls 6 until the last end

of the rod is brought opposite the gripping-block 39, when the attendant moves the block 39 into alinement with the trough 2 and inclosing the rod. The hand-lever 44 is then raised, causing the rear end of the rod to be clamped between the pointed end 42 of the finger 41 and the table 43, thereby checking the longitudinal movement of the rod. The forward end of the rod is then seized by an attendant and inserted between the web 20 and the radial finger 17 of the carriage 11, which has been moved along in proper position to meet the advancing end of the rod. The hand-lever 21 is then depressed, causing the pointed end 18 of the finger 17 to engage the end 19 of the rod and clamp it between the pointed end of the finger and the web 20, the pressure upon the hand-lever at the same time rocking the tilting frame 14 against the tension of the coiled spring 22 and carrying its hooked end 15 into engagement with one of the ratchet-teeth 10, thereby holding the carriage 11 from movement while the rod is being straightened. The upper end of the rod being now held from longitudinal movement and the lower end of the rod being engaged by the gripping mechanism supported by the free ends of the parallel arms 32 32, steam is admitted to the cylinder 26, thereby rocking the lever 28 and exerting a tensile strain upon the rod held in the gripping-block 39. As a tensile strain is exerted upon the rod the parallel arms 32 32, which had been deflected to one side, as represented in Fig. 6, for the purpose of bringing the gripping-block 39 into alinement with the trough 2, will be drawn into a position parallel with a straight line at right angles with the axis of the stud 29, drawing the rod into a straight line extending from the gripping-block 39 to the point of engagement of the rod with the carriage 11, thereby drawing the rod out of the trough 2 and over the inclined plate 9. The rod which has been straightened by the tensile strain exerted by the stretching mechanism is then released from its gripping mechanism and allowed to rest upon the inclined plate 9, from which it is moved by its own weight upon a series of inclined skids 48, which form a continuation of the inclined plane of the plate 9. Journaled beneath the inclined skids and at right angles thereto are the shafts 49, to which are attached radial arms 50 with their free ends projecting slightly above the upper surface of the skids when the shafts 49 are rocked in proper position. Parallel with the shafts 49 are the short rocking shafts 51, to which arms 52 are attached, connected by links 53 with one of the radial arms 50 upon each of the shafts 49 and having hand-levers 54, by which the shafts 51 are rocked and through the links 53 rocking the shafts 49, in order to carry the radial arms 50 above the upper surface of the inclined skids or depress them below the surface of the skids. The radial arms 50 serve as dogs to hold the rods which have been dropped upon the inclined table 9 from

moving down the skids, and these dogs are arranged at different positions throughout the length of the skids, so as to hold the rods in groups, with a few rods in each group, during the process of cooling, the first series of dogs stopping the rods near the upper end of the skids until a number of rods have accumulated, when the upper row of dogs are depressed and the rods held by them are allowed to move down the inclined skids and be caught by the next series of dogs, the first series of dogs being again raised into position to hold the next group of rods. When the second group of rods have been accumulated, the first group held by the second series of dogs is released and allowed to move down to the third series of dogs and the second series of dogs brought into position to receive the last-accumulated group of rods as they are released by the first series of dogs. The rods are thus held for a period of time at different stages of their movement over the inclined skids and before they are finally released in a cooled state upon the horizontal table 55 at the foot of the inclined skids, from which they are transferred to a series of positively-rotated rolls 56, by which they are moved endwise to suitable shearing apparatus 57, where they are cut into the desired lengths and delivered upon the table 58.

The trough 2 is provided with an angular bottom in its cross-section in order to cause the rod to move in the center of the trough during its longitudinal movement and also to allow it to be drawn laterally out of the trough by the application of a tensile strain between the clamped ends of the rod, which are outside the plane of the trough. A curvature is given to the trough 2 corresponding to the catenary curve assumed by the rod as it is suspended between the clamping mechanisms in order to cause the rod to clear the trough throughout its length.

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

1. The combination with a trough to receive the rod and means located at one side of said trough for clamping the advancing end of the rod, of means for imparting a tensile strain to said rod and comprising a movable member and gripping mechanism connected with said movable member, said gripping mechanism being capable of a lateral or sidewise movement, from a position in alinement with said trough to a position in alinement with said clamping mechanism whereby the rod is carried out of said trough and to one side thereof during the operation of straightening, substantially as described.

2. The combination with a pair of rolls and a trough arranged to receive a rod projected from said rolls of a clamping mechanism located at one side of said trough to clamp the advancing end of the rod, a gripping-block in alinement with said trough, and means for moving said gripping-block to impart a ten-

sile strain to the rod and to carry it into alinement with said clamping mechanism, substantially as described.

3. The combination of a trough to receive the rod and having a V-shaped bottom and a vertical side wall, a clamping mechanism capable of sliding on said wall, means for fastening said clamping mechanism, a gripping-block, means for moving said gripping-block to impart a tensile strain to said rod, substantially as described.

4. The combination of a trough to receive the rod, means for clamping said rod at its forward or advancing end, and means for imparting a tensile strain to said rod, and consisting of a movable member, a pair of parallel arms pivoted to said movable member, a gripping-block pivotally connected to the opposite ends of said parallel bars, whereby said gripping-block is capable of being moved laterally to bring it into alinement with said trough, substantially as described.

5. The combination with means for clamping the ends of the rod, of means for imparting a tensile strain thereto, and consisting of a movable member, and means for actuating the same, a pair of parallel bars pivoted to said movable member, a gripping-block carried by the opposite ends of said parallel bars, and provided with a table upon which the rod is clamped, and a finger pivoted on said block and arranged to engage the rod and hold it from longitudinal movement.

6. The combination with means for clamping the advancing end of the rod, of a gripping-block for clamping the rear end of the rod, said block being open at its side and capable of being moved laterally to engage the rod and means for moving said gripping-block to impart a longitudinal strain to the rod, substantially as described.

7. The combination of a trough to receive the rod, a series of feed-rolls by which the rod is moved along said trough, means for actuating said feed-rolls, a clamping mechanism adjustable along said trough, means for holding said clutching mechanism from movement, a gripping-block, and means for moving said gripping-block to impart a tensile strain to said rod, substantially as described.

8. The combination of means for clamping the ends of the rod, a trough to receive the rod, and means for imparting a tensile strain to said rod between two points above and at one side of said trough, whereby said rod is raised above said trough, and carried to one side of said trough, substantially as described.

9. The combination of a trough to receive the rod, an inclined surface at one side of said trough, means for clamping the ends of said rod, and means for exerting a tensile strain upon said rod, said tensile strain being exerted between two points vertically above said inclined surface, whereby said rod is carried over said inclined surface in the operation of straightening, substantially as described.

10. The combination with means for clamping the forward end of the rod comprising a carriage, a hooked tilting frame supported by said carriage, a series of stationary teeth
5 adapted to be engaged by said hooked frame and means for engaging the end of the rod carried by said tilting frame, substantially as described.

11. The movable carriage a tilting hooked
10 frame supported by said carriage, a series of stationary teeth adapted to be engaged by said hooked frame, a spindle journaled in said tilting frame, a radial finger carried by said spindle and adapted to engage the rod,
15 a lever-handle attached to said spindle and projecting parallel with the hooked end of said frame, and a support for the end of the rod, whereby the rod is clamped and the hooked end of said frame simultaneously en-

gaged by the movement of said hand-lever, substantially as described.

12. The combination of a series of inclined skids over which the rods are moved by gravity, a series of dogs arranged at intervals along said skids between their highest and lowest ends and projecting above the upper surface of said skids, whereby the rods are arranged in a series of groups with a limited number in each group and means for depressing said dogs, *seriatim*, whereby said groups of rods are successively released, substantially as described.

Dated this 2d day of May, 1896.

VICTOR E. EDWARDS.

Witnesses:

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