No. 685,465. Patented Oct. 29, 1901.

P. BOYD.

STRAIGHTENING TROUGH AND DELIVERY GUIDE TO COOLING TABLES.

(Application filed Dec. 20, 1900.)

(No Model.) 3 Sheets—Sheet 1.

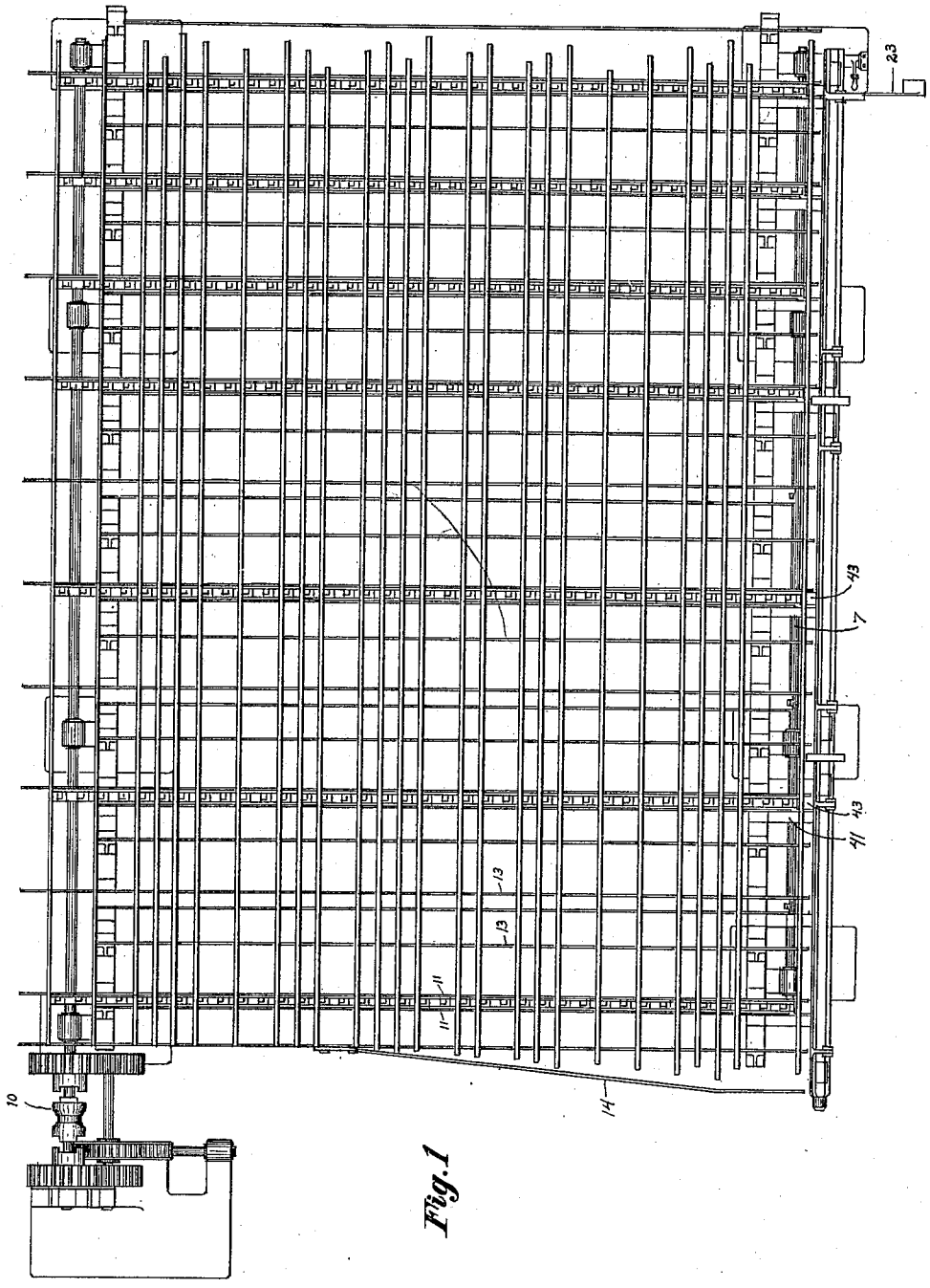


Fig. 1.

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Fig 7

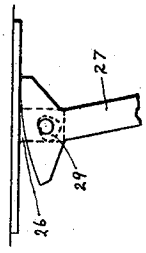


Fig 6

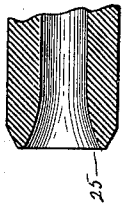


Fig. 5

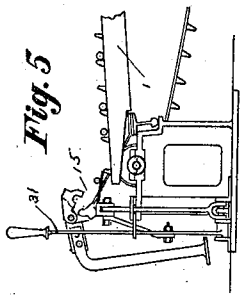


Fig. 2

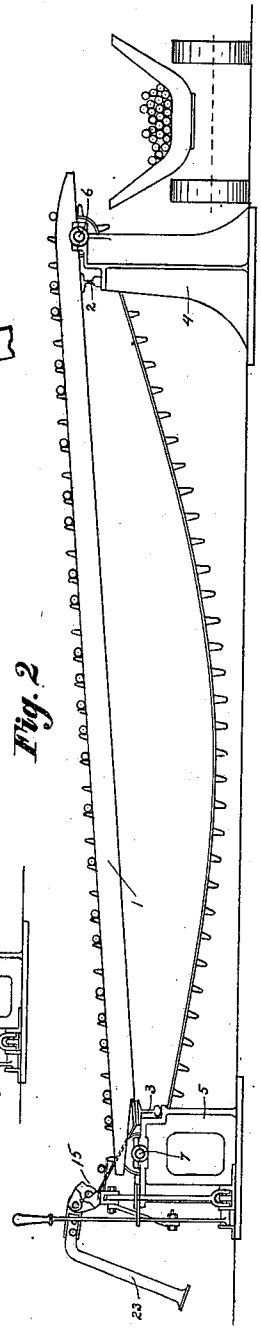


Fig. 4

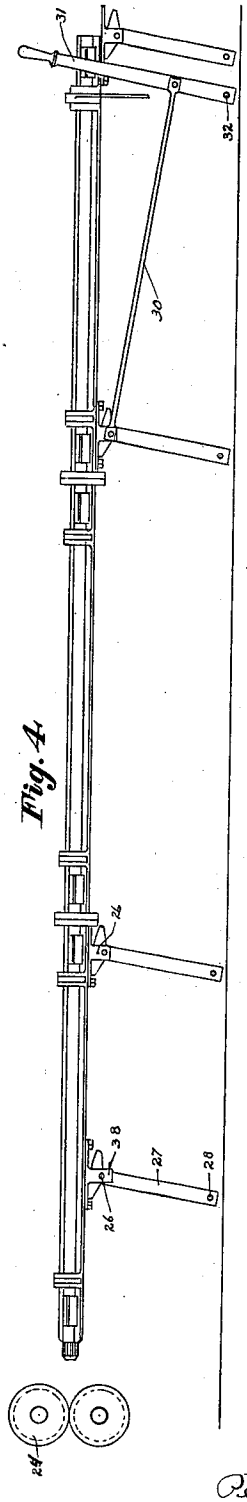
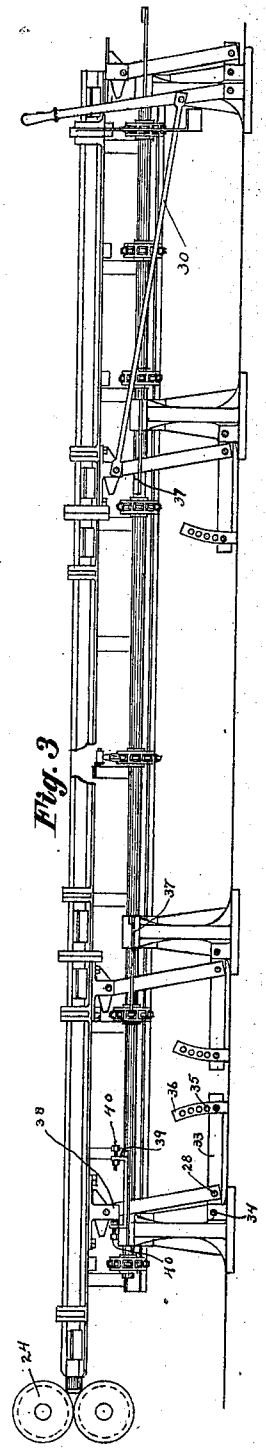


Fig. 3



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(No Model.) 3 Sheets—Sheet 3.

Fig. 9

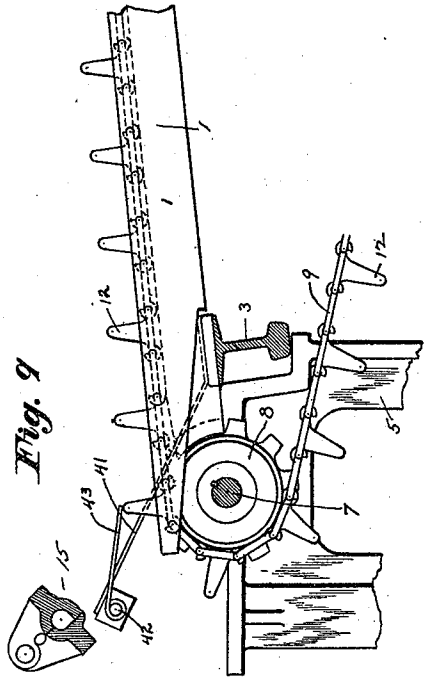


Fig. 10

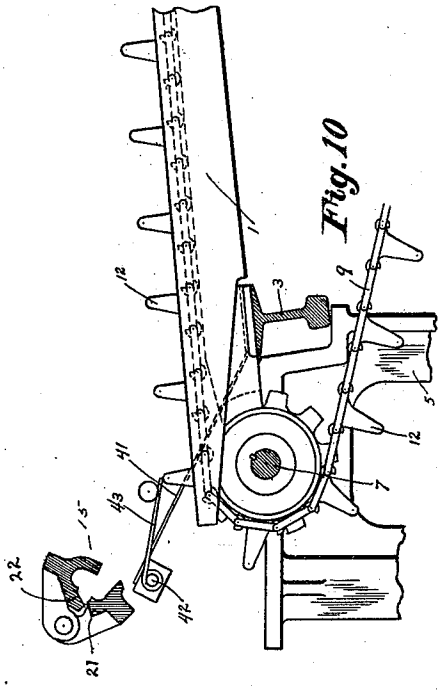


Fig. 8

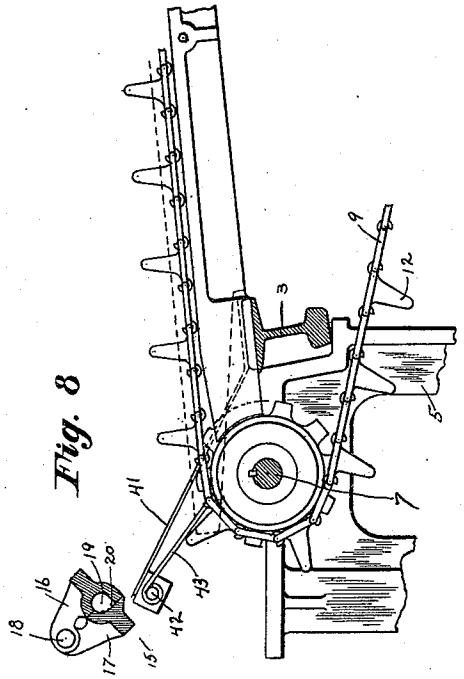
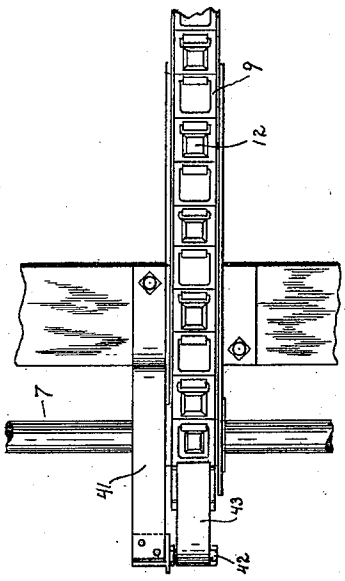


Fig. 11



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UNITED STATES PATENT OFFICE.

PETER BOYD, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE NATIONAL TUBE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

STRAIGHTENING-TROUGH AND DELIVERY-GUIDE TO COOLING-TABLES.

SPECIFICATION forming part of Letters Patent No. 685,465, dated October 29, 1901.

Application filed December 20, 1900. Serial No. 40,470. (No model.)

To all whom it may concern:

Be it known that I, PETER BOYD, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Straightening-Troughs and Delivery-Guides to Cooling-Tables; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a trough for receiving pipes and bars from the sizing-rolls and a guide for delivering the pipes or bars from said trough to the cooling-table, and has for its object devices of the character specified, whereby the pipes or bars will be straightened by the trough as they are received from the sizing-rolls and be automatically delivered to the cooling-table, so that they cannot again become bent, thereby dispensing with the use of cross-rolls or other straightening devices.

In the manufacture of pipes and tubes as heretofore practiced the pipe or tube after being welded was passed through the sizing-rolls and thence to a pair of cross-rolls for straightening the same, after which it was delivered to a cooling-table. The ordinary cooling-table comprises a series of slides arranged in an inclined direction and a series of chains provided with projections, said chains passing over suitably-driven sprocket-wheels at the upper and lower ends of the slides. The pipes rest on the slides, and the projections on the chains carry the pipes or tubes up the inclined slides and deposit them in a car or other suitable device at the upper end. In passing up the inclined slides the tubes or pipes are constantly rotated in order that they may cool uniformly and also to prevent their bending while cooling. With the mechanism heretofore in use it frequently happened that one end of the pipe was delivered to the cooling-table in advance of the other end, and inasmuch as the projections on the various chains of the cooling-table are all in line one end of the pipe was liable to fall in front of a projection on one of the chains, while the other end of the pipe would fall behind the corresponding projection on another of the chains, so that the pipe was bent and carried in this manner up the inclined cooling-table. This necessitated the employment of boys to lift the ends of the pipes and deposit them in front of the proper projections on the chains; but after a pipe has once been bent by being improperly delivered to the cooling-table it cannot be straightened by this expedient, but it has been found necessary to straighten the pipe by suitable straightening means as soon as it becomes cool enough to handle.

It is the object of my invention to dispense with the cross or other straightening rolls and provide a trough whereby the pipe or tube is received from the sizing-rolls and straightened and also provide means whereby the pipe is delivered from the trough to the cooling-table automatically and in such a manner that one end thereof cannot fall on the chains in advance of the other end, thereby preventing the pipe from becoming bent.

To this end my invention comprises a closed trough for receiving the tube from the sizing-rolls, said trough being of a size internally but slightly larger than the pipe or tube, so that the latter will be straightened as it passes into the trough, said trough being so constructed that it can be readily opened to discharge the pipe therefrom. In connection with this trough I use a fixed guide and a pivoted guide which automatically delivers the pipe from the trough to the cooling-table in such a manner as to prevent one end falling on the chains in advance of the other end.

In the accompanying drawings, Figure 1 is a plan view of the cooling-table and my improved straightening-trough. Fig. 2 is an end view of the same. Fig. 3 is a front view of the cooling-table and trough. Fig. 4 is a detail view showing the trough in its retracted position. Fig. 5 is a detail end view showing the manner of discharging the pipe from the trough. Fig. 6 is a longitudinal section of the front end of the trough. Fig. 7 is a detail of the upper end of the rocker-arm. Fig. 8 is an end view of a portion of the cooling-table and my improved guides. Fig. 9 is a similar view with the chain and pivoted guide in another position. Fig. 10 is a similar view showing a pipe upon the pivoted guide, and Fig. 11 is a plan view of one of the guides and chains.

The cooling-table comprises the slides 1 1, which are mounted on the rails 2 3, secured

to the standards 4 5, the standards 4 being higher than the standards 5, so that the slides 1 are in an inclined position. In the standards 4 is mounted the shaft 6, and in the standards 5 is mounted a similar shaft 7. On these shafts are secured sprocket-wheels 8 8, over which run the chains 9, the latter having their upper reaches lying on the upper surface of the slides 1 1. The shaft 6 is driven by a suitable motor or engine and can have two rates of motion imparted to it by means of the clutch 10. To the sides of the slides 1 are secured guides 11, which project above the upper face of the slides a distance substantially equal to the thickness of the chains 9, and the pipes or bars in passing up the cooling-table roll on the faces of the guides 11. The chains are provided at intervals with projections 12 for engaging the pipes or bars and carry the same up the cooling-table, the projections on the various chains being in line with each other. Between the slides 1 the table is provided with additional guides 13, which are secured to the rails 2 and 3 and which serve to support the pipes between the guides 11. At one end the table is provided with an inclined plate or guide 14, which projects above the guides 11 and alines the ends of the pipes or bars.

In front of the cooling-table is mounted the straightening-trough 15, which comprises two longitudinal sections 16 and 17, hinged together, as at 18, said sections having formed therein the opening 19, which is cylindrical through about three-quarters of its circumference, the walls of said opening at the meeting portions of the two sections at the discharge side being formed tangential, as at 20, to permit the pipe passing readily out of said trough when it is opened. The two sections of the trough are provided with coöperating lugs 21 22, which serve to accurately center said sections when closed in case the pivot-pins 18 become worn or loose. The upper section has secured thereto the lever 23, by means of which said section can be raised to open the trough, the weight of the section being sufficient to cause the trough to close when pressure on the lever 23 is removed. The opening 19 in the trough is but slightly larger than the pipe or bar to be received therein, so that as the pipe or bar passes into the trough it is straightened. As a consequence a different trough is necessary with each different size of pipes or bars. The forward end of the trough projects into the pass of the sizing-rolls 24, and the opening 19 in this end of the trough is bell-mouthed, as shown at 25, Fig. 6, and is increased so as to be considerably in excess of the diameter of the pipe, so that the latter can pass readily from the sizing-rolls 24 into the trough. The lower section of the trough is provided with lugs 26, which are pivoted to the upper ends of the rocker-arms 27, the latter being pivoted at their lower ends on the pins 28 and have their upper ends in the form of an arc struck about 28 as a center. To permit the trough 15 moving longitudinally without binding on the upper ends of the rocker-arms, the holes 29 in the lugs 26, through which pass the pins which secure the lugs to the rocker-arms, must either be enlarged or formed triangular or heart-shaped, as shown in Fig. 7. To one of the rocker-arms 27 is secured one end of the connecting-rod 30, the opposite end of which is secured to the lever 31, pivoted to the base at 32. By means of this lever the arms 27 can be rocked and the trough moved toward the sizing-rollers 24 to receive the pipe and then away from said rollers to discharge the pipe from the trough. The lower ends of the rocker-arms 27 are pivoted to the levers 33, the latter having one end pivoted at 34 and having their opposite ends held at any desired height by means of a pin passing through said levers and into any one of the series of holes 35 in the stationary segments 36. By this simple means the rocker-arms and trough supported thereby may be adjusted to any desired height to bring the trough into alinement with the pass of the sizing-rolls, which pass may be higher or lower, according to the size of pipes or bars being produced.

The rocker-arms 27 are guided in their to-and-fro motion by slotted plates 37, secured to the tops of the standards 5. Projecting downwardly from one of the lugs 26 on the lower section of the trough is the finger 38, and the plate 37, by which the corresponding rocker-arm is guided, has its ends turned up, as at 39, and provided with the adjusting-screws 40, which lie in the path of the finger 38 and limit the movement of the trough in both directions, as will be readily understood. By adjusting the screws 40 the movement of the trough can be limited as desired.

Secured to the rail 3 are a series of fixed guides 41, which project upwardly and forwardly and have their outer ends in position to receive the pipes from the trough 15 and guide the latter from said trough to the cooling-table. To the outer ends of these guides are pivoted, by means of pins 42, the leaf-guides 43, the free ends of which lie over the chains 9 of the cooling-table, and as the chains move on the slides 1 the free ends of the guides 43 rise and fall alternately from the position shown in Fig. 8 to that shown in Fig. 9. These guides are for the purpose of preventing the ends of the pipe falling in front of different projections on the chains 9.

In the operation of my device the trough 15 is moved toward the sizing-rolls to the position shown in Fig. 3 and the pipe or tube emerging from said rolls enters the opening in the trough and is straightened thereby. The operator then moves the lever 31, withdrawing the trough from the sizing-rolls to the position shown in Fig. 4, and then places his foot on the end of the lever 23, thereby opening the trough and allowing the pipe to pass out of the same and upon the fixed guides

41. Should the chains all be in the position indicated in Fig. 8, the pipe will pass immediately down the guides 41 until it rests on the guides 11, in which position it will remain until the next projections 12 on the chains 9 contact therewith and roll the same slowly up the cooling-table. Should, however, the chains be in a position so that the projections 12 are about to pass the guides 41, then if one end of the pipe should be in advance of the other there would be liability of said end passing in front of the projection 12 on one of the chains, while the other end of the pipe would not reach the chain until the corresponding projection had passed beyond the guide 41, so that that end of the pipe would fall behind said projection, and as a consequence the pipe would become bent. It is just here that the pivoted guides 43 come into play. As the projections 12 on the chain pass the guides 41 they raise the free ends of the pivoted guides 43 to the position indicated in Fig. 9, so that if in this position a pipe is discharged from the trough and if one end thereof is in advance of the other it will pass down the guide 41 until it reaches the pivoted guide 43, and as the latter is in approximately a horizontal position it checks the forward movement of that end of the pipe until the other end has an opportunity to catch up therewith, and then both ends of the pipe will fall either in front of the projections on the chains or, if these are too far advanced when the pivoted guides drop from said projections, the pipe will fall behind the same and be carried up the cooling-table by the next projections on the chains and in a straight position. It will thus be seen that I provide means for receiving the pipes from the sizing-rollers and straightening the same, which dispenses with the use of cross-rolls and also providing means for automatically delivering the pipes to the cooling-table in such a manner that they cannot again become bent.

While the invention has been described more particularly with reference to the manufacture of tubes and pipes, it is also applicable to the manufacture of solid bars, and I wish it understood that the scope of the claims is intended to cover the latter. Furthermore, while the invention is designed to dispense with cross-rolls or other special straightening devices, nevertheless cross-rolls are sometimes deemed necessary in the manufacture of pipes or bars, not only for the purpose of straightening the pipes or bars, but also for cleaning and scouring the same. I therefore desire it to be understood that my trough may be used in connection with straightening or cross rolls, if desired. The specific manner of mounting the trough is not essential, as it may be mounted upon rollers instead of the rocker-arms shown, only in that case more power would be required to move it. As a matter of fact, the rocker-arms are segments of large rollers. The sections of the trough are so constructed that the pipe will be readily discharged therefrom and said trough will close automatically, and a further advantage is that if a defective or laminated pipe or bar should stick in the trough the latter can be readily opened to allow the removal of such laminated piece.

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

1. In apparatus for manufacturing pipes and bars, the combination with the sizing-rolls, of a trough having one end projecting into the pass of said rolls and adapted to receive and confine the pipe or bar, and means for ejecting the pipe from said trough.

2. A trough for straightening pipes and bars comprising two longitudinal sections hinged together, and coöperating lugs on said sections adapted to center the same.

3. In apparatus for finishing pipes and bars, the combination with the sizing-rolls, of a trough having one end adapted to project into the pass of said rolls and adapted to receive and confine the pipe or bar, and means for moving said trough toward and from said rolls.

4. In apparatus for manufacturing pipes and bars, the combination with the sizing-rolls, of a trough adapted to receive and confine the pipe or bar, rocker-arms on which said trough is mounted, and means for rocking said arms to move the trough toward and from said rolls.

5. In apparatus for manufacturing pipes and bars, the combination with the sizing-rolls, of a trough adapted to receive and confine the pipe or bar, means for moving said trough toward and from said rolls, and adjustable stops for limiting the movement of the trough.

6. In apparatus for manufacturing pipes and bars, the combination with the sizing-rolls, of a trough adapted to receive and confine the pipe or bar, and means for adjusting said trough vertically.

7. In apparatus for manufacturing pipes and bars, the combination with the sizing-rolls, of a trough adapted to receive and confine the pipe or bar, rocker-arms on which said trough is mounted, levers to which the lower ends of the rocker-arms are pivoted, and means for adjustably supporting one end of said levers.

8. A trough for straightening pipes and bars comprising two sections hinged together, a lever secured to the upper section for opening the same, rocker-arms pivoted to the lower section for supporting the same, and means for adjustably supporting said rocker-arms.

9. In apparatus for manufacturing pipes and bars, the combination with a receiving-trough, cooling-table, and its carrying-chains, of the guides pivoted adjacent the receiving-trough and having their free ends projecting over the carrying-chains of the cooling-table.

10. In apparatus for manufacturing pipes and bars, the combination with the receiving-

trough, cooling-table, and its carrying-chains, of the fixed guides extending from the trough to the cooling-table, and the leaf-guides pivoted to the fixed guides and having their free ends projecting over the carrying-chains of the cooling-table and resting thereon.

11. In apparatus for manufacturing pipes and bars, the combination with the sizing-rolls and cooling-table, of a trough for receiving the pipe from the rolls and straightening the same, and automatic guides for directing the pipe from the trough to the cooling-table without liability of bending the same.

In testimony whereof I, the said PETER BOYD, have hereunto set my hand.

PETER BOYD.

Witnesses:
ROBERT C. TOTTEN,
F. W. WINTER.