

997,765.

Patented July 11, 1911.

3 SHEETS—SHEET 1.

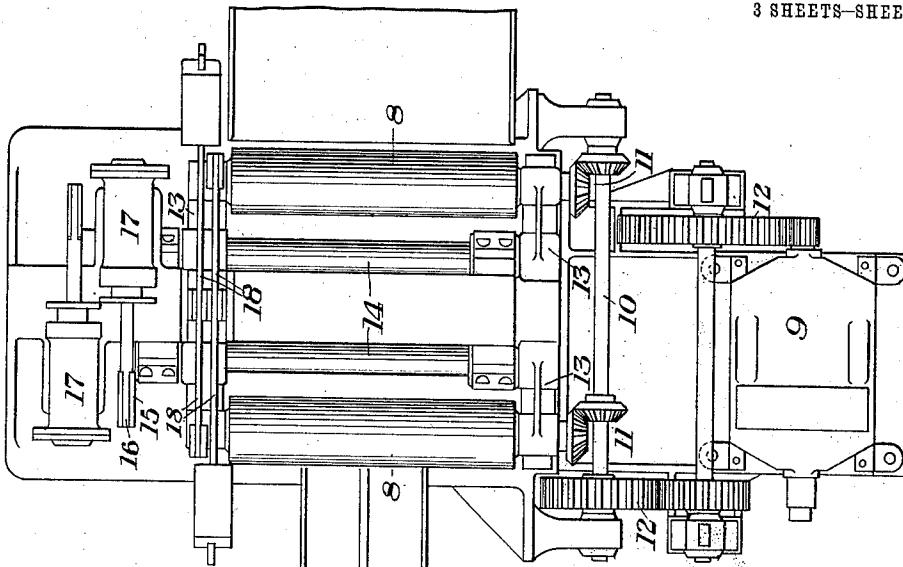
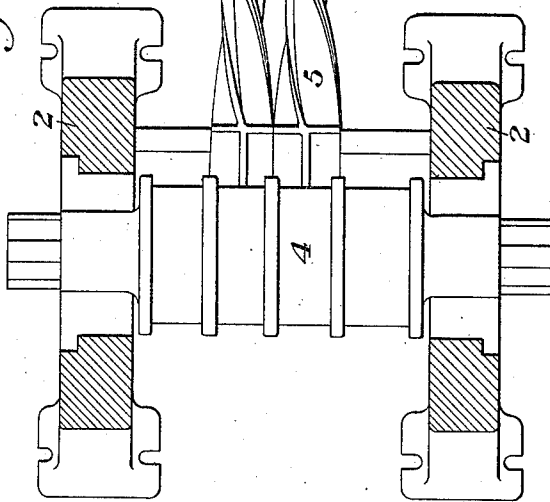


Fig. 1.



WITNESSES

R. H. Baldwin
W. F. Sammons

INVENTOR

F. I. Ellis
by Bohrer, Rogers & Parnell
his Attys.

997,765.

F. I. ELLIS.
ROLLING MILL.
APPLICATION FILED DEC. 24, 1910.

Patented July 11, 1911.
3 SHEETS-SHEET 2.

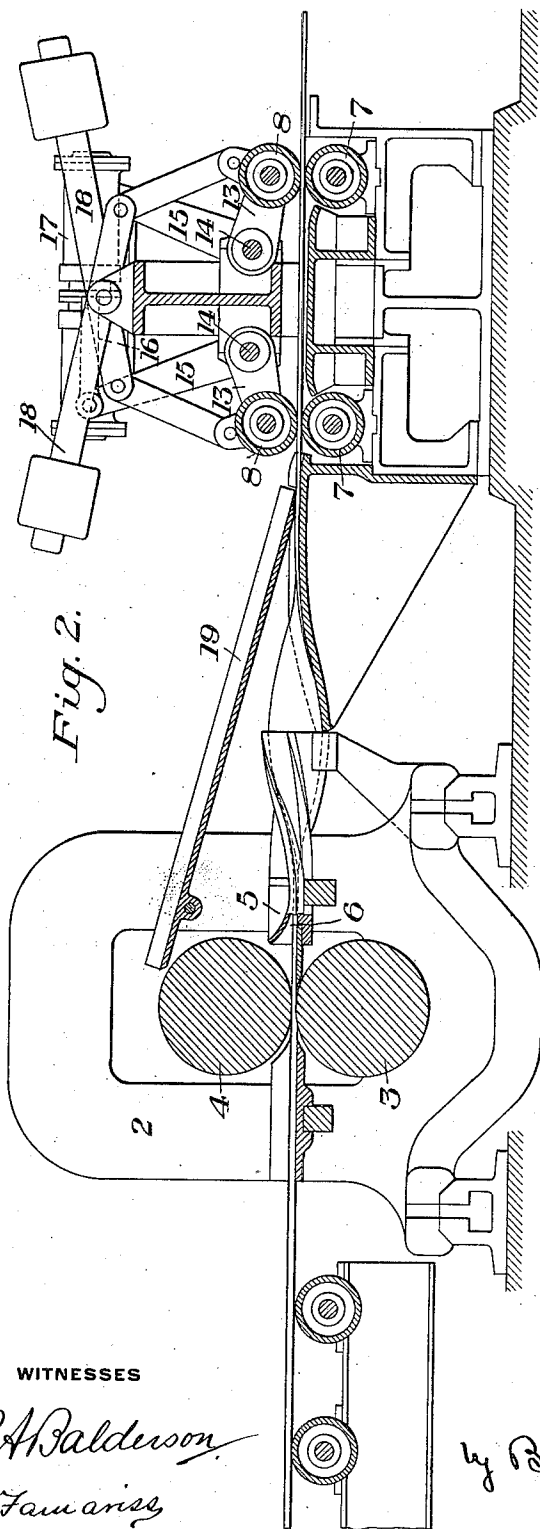


Fig. 2.

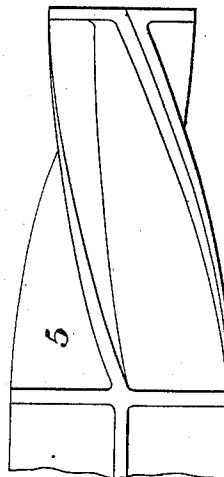


Fig. 4.

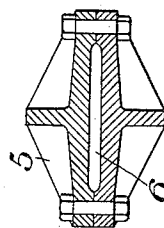


Fig. 3.

WITNESSES

R. A. Balderson
W. F. Lariss

INVENTOR

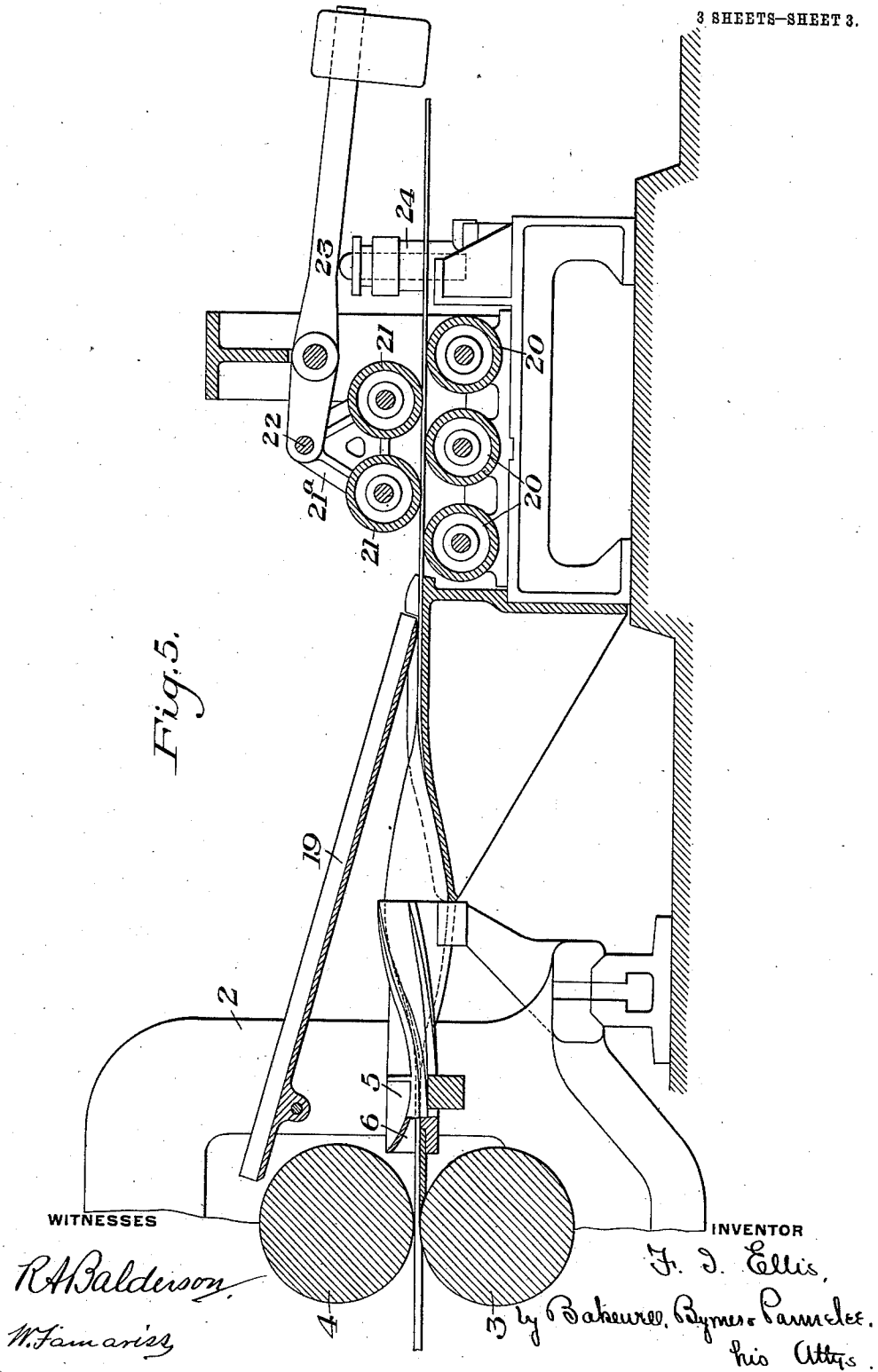
F. I. Ellis.
by Babcock, Byones & Parmelee.
his Attys.

997,765.

Patented July 11, 1911.

3 SHEETS—SHEET 3.

Fig. 5.



UNITED STATES PATENT OFFICE.

FRANK I. ELLIS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO UNITED ENGINEERING & FOUNDRY COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ROLLING-MILL.

997,765.

Specification of Letters Patent.

Patented July 11, 1911.

Application filed December 24, 1910. Serial No. 599,234.

To all whom it may concern:

Be it known that I, FRANK I. ELLIS, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rolling-Mills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view partly in horizontal section of a rolling mill embodying my invention; Fig. 2 is a longitudinal vertical section of the same; Fig. 3 is a cross section of one of the twist guides; Fig. 4 is a side view of a portion of the same; and Fig. 5 is a longitudinal section of a portion of the mill showing a modification.

My invention relates to rolling mills, especially two-high mills used for rolling relatively thin bars, and is designed to provide simple and effective means for turning the bars over after passing through the rolls and for moving them back to the mill.

The nature of my invention will be best understood by reference to the drawings, in which I have shown two forms thereof, and which will now be described, it being premised, however, that various changes may be made in the details of construction and arrangement of the parts by those skilled in the art, without departing from the spirit and scope of my invention, as defined in the claims.

In these drawings, in which I show the invention applied to a two-high mill, 2 designates the roll housings of the mill, 3 the lower roll, and 4 the upper roll. At the rear or delivery side of the rolls I provide one or more twist guides 5, which are in line with the respective roll passes and have an internal cross section approximating the cross section of the bar as it is delivered by the roll pass in line with which the guide is placed. A cross section of one form of guide is shown in Fig. 3, 6 being the guide passage through which the bar passes. This guide is twisted in the manner shown in Figs. 1, 2 and 4, and turns the bars through approximately ninety degrees, so that the bar coming flatwise through the roll pass will be turned on edge and over upon the other side. Beyond the twist guides are a series of combined pinch and straightening rollers, consisting of lower

rollers 7 and upper rollers 8. The lower rollers are positively driven by any suitable means, such as an electric motor 9, which is connected with a drive shaft 10, geared to the necks of the rollers at 11.

12 designates the reduction gearing between the motor and the shaft 10.

In the form of Figs. 1 to 4, each of the upper rollers 8 is immediately above one of the lower rollers 7, and is journaled in arms 13 of a rock shaft 14. Each of these rock shafts has an upwardly extending lever arm 15, which is connected by a link 16 with the piston of a power cylinder 17. The two power cylinders and the connections are so arranged, as clearly shown in Figs. 1 and 2, that when power is admitted to the cylinders, the rollers 8 will be forced toward the rollers 7. Each roller is also provided with a counterweighted lever 18, which, when power is cut off from the cylinder 17, acts to raise the upper roller away from the lower roller.

19 is an inclined guide which extends upwardly and forwardly from a point near the first pair of rollers 7 and 8 to the top of the roll 4.

The operation will be readily understood. The bars as they issue from the pass of the rolls 3 and 4, move through one of the twist guides and are turned over, passing thence forwardly under the end of pivoted guide 19 and through the combined pinch and straightening rollers 7 and 8. The motor 9 is then reversed, which reverses the direction of the rollers 7 and thereby the rollers 8 and the bars are carried backwardly by these rolls and up the guide 19 over the roll 4. The guide 19 normally rests by gravity on the table, so that the piece being rolled can raise it and pass on thereunder in moving toward the roll 8, as shown in Fig. 2. On the reverse movement of the piece, the guide will catch its advancing end and deflect the piece upwardly into the guide. The piece is then carried forwardly over the top roll into position to be given another rolling pass through the rolls 3. The turning of the piece through an angle of 180 degrees in the manner shown, has for its main object the removal of scale from the piece, this turn being very effective for that purpose. The bar is thus turned and scaled intermediate its passes through the rolls, it being understood that it is moved back over

the guide 19 and upper roll 4 for the purpose of giving it another roll pass.

In Fig. 5, which shows a modified arrangement of the straightening and pinch rolls, I provide three positively driven lower rollers 20, and two upper rollers 21, which are arranged intermediate of the rollers 20, and are journaled in brackets 21^a supported by a shaft 22, having a counterweighted lever 23, attached thereto. A power cylinder 24 has lifting engagement with the under side of the power arm of this lever. When power is admitted to the cylinder 24, the rollers 21 are forced toward the rollers 20, and when power is shut off from this cylinder, the counterweighted lever 23 acts to separate the upper and lower rollers. The operation is otherwise similar to that first described.

My invention provides a very simple, practical and efficient device for turning relatively thin bars after passing through the mill and for returning them to the mill.

The invention may be applied to other types of mills, whether reversing or not, and many changes may be made in the guide and pinch rolls for returning the metal to the mill, without departing from my invention as defined by the appended claims.

I claim:—

1. In a rolling mill, a twist guide arranged at the delivery side of the rolls, a set of pinch rollers in rear of said guide, and means for reversing the direction of said rollers; substantially as described.

2. In a rolling mill, a twist guide arranged at the delivery side of the rolls, a set of pinch rollers in rear of said guide, means for reversing the direction of said rollers, and an inclined pivoted guide intermediate of the mill and the pinch rollers; substantially as described.

3. In a rolling mill for bars, a twist guide at the rear or delivery side of the mill rolls, a set of pinch and straightening rollers arranged in rear of said guide, means for posi-

tively rotating some of said rollers and for reversing the direction thereof, and means for moving one set of rollers toward and away from the other rollers; substantially as described.

4. In a rolling mill for bars, a twist guide at the rear or delivery side of the mill rolls, a set of pinch and straightening rollers arranged in rear of said guide, means for positively rotating some of said rollers and for reversing the direction thereof, and means for moving one set of rollers toward and away from the other rollers, together with an inclined pivoted guide arranged intermediate of the mill rolls and the combined pinch and straightening rollers; substantially as described.

5. In a two-high rolling mill for bars, the combination with a pivoted guide arranged to return the bars over the top of the upper mill roll, of a twist guide arranged underneath the pivoted guide and adapted to cause a turning of the bars passing there-through, separate feed and pinch rollers arranged at the rear of said guides, means for positively rotating some of said rollers and for reversing the direction of rotation thereof, power cylinders for forcing the upper rollers of the set toward the lower rollers, and counterweights acting upon the upper rollers in opposition to the power cylinders; substantially as described.

6. In a rolling mill, the combination with mill rolls, of guide and feed devices arranged behind said rolls and arranged to invert the pieces delivered by the rolls, straighten them in their inverted position and return them to the mill; substantially as described.

In testimony whereof, I have hereunto set my hand.

FRANK I. ELLIS.

Witnesses:

F. C. BIGGER, Jr.,
H. M. CORWIN.