

No. 759,984.

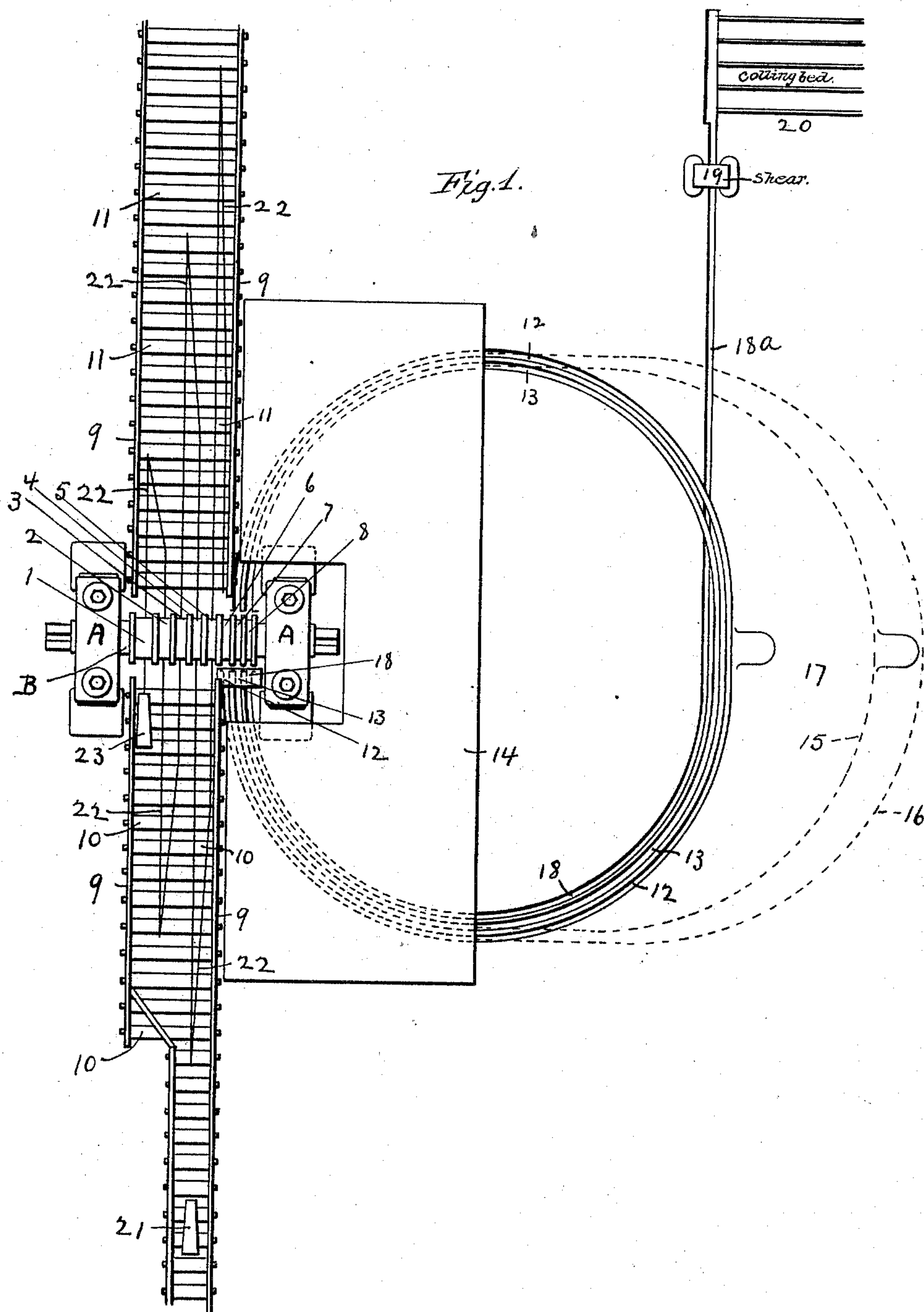
PATENTED MAY 17, 1904.

J. R. GEORGE.  
ROLLING MILL.

APPLICATION FILED NOV. 23, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses

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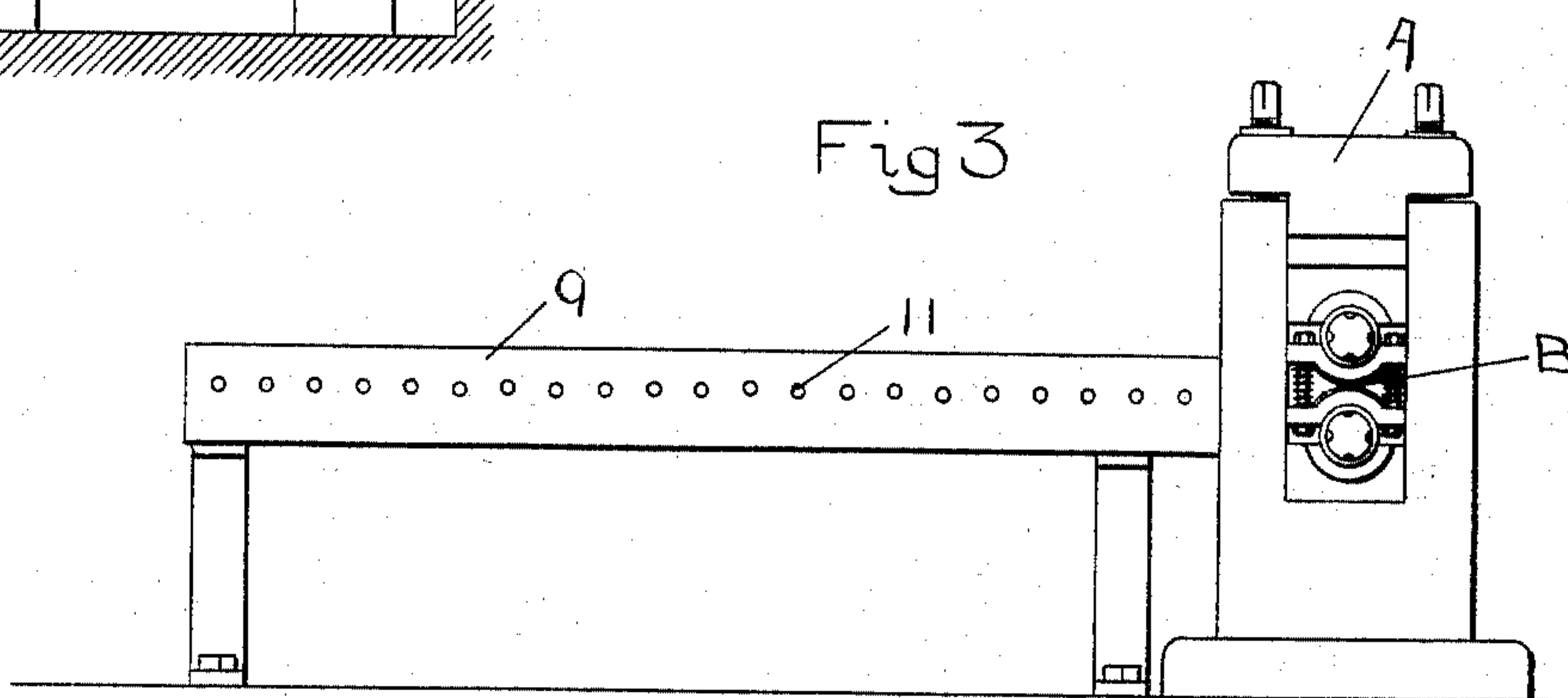
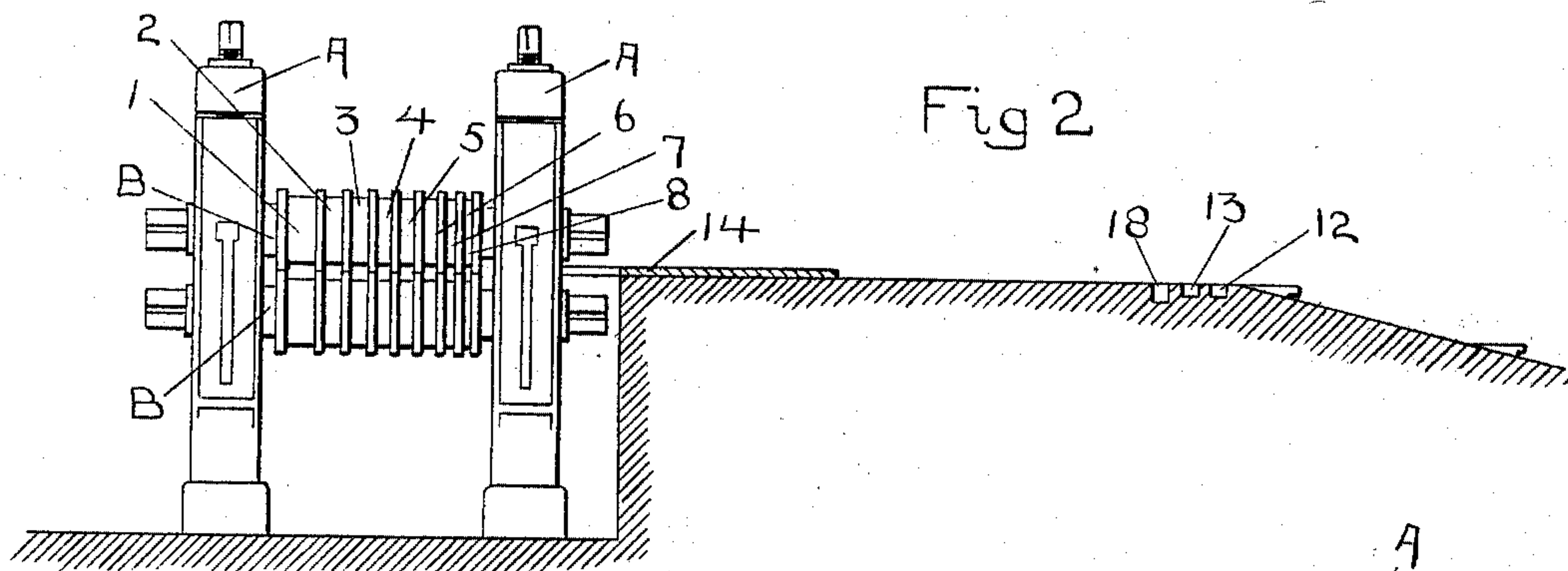
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Witnesses

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# UNITED STATES PATENT OFFICE.

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## ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 759,984, dated May 17, 1904.

Application filed November 23, 1903. Serial No. 182,227. (No model.)

*To all whom it may concern:*

Be it known that I, JEROME R. GEORGE, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have in-  
5 invented a new and useful Improvement in Rolling-Mills, of which the following is a specification, accompanied by drawings forming a part of the same, in which—

10 Figure 1 represents a plan view of a rolling-mill embodying my invention. Fig. 2 is a front view of the roll-housing and a pair of rolls contained therein, and Fig. 3 is a side view of the roll-housing.

15 My present invention relates to a rolling-mill comprising a single pair of two-high rolls, a straight conveyer, and one or more curved repeaters of three hundred and sixty degrees extending around one of the roll-  
20 housings. The pair of rolls are provided with a series of passes, the first part of which I term "reducing-passes," through which the metal is first fed from the straight conveyer, the motion of the rolls being reversed at each  
25 pass, and the last part of the series I term "finishing-passes," through which the metal is passed from the curved repeaters in a continuous movement in the same direction. In the first part of the series of passes the ingot  
30 is reduced in cross-section and elongated into a rod or bar which is brought to an accurate dimension in cross-section by its passage through the remaining passes.

The objects of my invention are to effect a  
35 material economy in rolling rods or bars direct from the ingot, to reduce the loss incident to the subdivision of the rod into desired lengths, to prevent a twist being imparted to the finished rod owing to the im-  
40 perfect alinement of the circumferential grooves of the rolls, and to enable the finished product to be rolled to an accurate dimension in cross-section, and I accomplish these objects by the construction and arrangement of  
45 parts, as hereinafter described, and pointed out in the annexed claims.

Referring to the accompanying drawings, A denotes the housings of a two-high rolling-mill containing a pair of rolls B, only the upper roll being visible in the drawings. The  
50 reducing-passes of the rolls B are shown at 1, 2, 3, 4, 5, 6, 7, and 8. The number of the passes may be increased or diminished without interfering with my invention.

9 is the framework of the straight conveyer, 55 in which are journaled the rolls 10 and 11, upon which the ingot is advanced toward the rolls B of the rolling-mill.

12 and 13 are repeaters (shown in dotted lines) under the plate or cover 14, by which  
60 the rod is conducted from one pass of the rolls to the next succeeding pass during the continuous reduction of the rod. The repeaters 12 and 13 serve as conduits for the rolled metal, and they are preferably grooves  
65 placed in the floor of the mill, or, if desired, they may consist of troughs or tubes.

The dotted lines 15 and 16 indicate the loops upon the floor 17 of the mill which the rod  
70 may assume in case of an overfeed.

18 is a curved section of a groove leading to a straight way or track 18<sup>a</sup>, by which the rod is guided through a shear 19 and onto a cooling-bed 20.

21 represents an ingot entering the con- 75 veyer on its way to the rolling-mill, and the lines 22 represent its path through the reversing-passes before it enters a curved repeater.

The operation of my invention is as follows: 80 The ingot 21 is conducted by the conveyer-rolls 10 into the position shown at 23 to enter the reducing-pass 1 of the rolling-mill. The ingot is presented to this pass with its small end foremost, which facilitates the bite of  
85 the rolls B upon the ingot. After the ingot passes through the reducing-pass 1 the rolls B are reversed at each successive passage of the ingot through the rolls until the pass 6 is reached, in which the opposite end of the in-  
90 got is presented to the rolls from that presented to pass 1. From pass 6 the piece en-



ters the curved repeater 12 and is conducted around one of the roll-housings to pass 7. After leaving pass 7 it is conducted by the curved repeater 13 to pass 8 and thence  
 5 through the curved section of the groove 18 and is conducted to the straight groove 18<sup>a</sup>, leading to shear 19. The rolled rod or bar is cut into desired lengths by the shear 19, which may be of any known and suitable construction, and the lengths may be deposited upon  
 10 the cooling-bed 20. In the operation of my improved rolling-mill it will be observed that the ingot is presented to pass 1 of the rolls with its small end foremost and is presented  
 15 to the curved repeaters, and consequently to the shear 19, with its opposite end foremost. This reversal of rolled metal end for end is desirable for the reason that in casting the ingot in an upright position the impurities of  
 20 the molten metal rise to the top or smaller end of the ingot, which, therefore, is more or less imperfect and unsound, and although the ingot is advanced with its unsound end foremost it is reversed before arriving at the  
 25 shear, so that the separate lengths are cut beginning at the sound end of the rod, and any fractional length remaining will come next to the unsound end of the rod, thereby effecting an economy in cutting the rod into lengths. I  
 30 also conduct the rod from the last pass of the rolls into a curved section of a groove or track 18 before it reaches the shear, and I thereby check the initial twist which may be given to the rod due to any defect in the alinement of  
 35 the grooves of the rolls. In practice it has been found that excessive wear of the roll-bearings or other causes often gives an initial twist to the rod as it passes through the grooves of the rolls, and this initial twist, which may  
 40 be very slight, constantly repeats itself in case the rod is conducted in a straight line until it becomes necessary to correct the torsional deformity of the rod or bar. I obviate this defect by delivering the rod or bar di-  
 45 rectly from the last pass of the rolls into a curved groove, which holds the rod or bar from turning, and conducting the rod or bar through said curved section to the straight groove 18<sup>a</sup>, leading to the shear.  
 50 The conveyer-rolls 11 are preferably longer than the conveyer-rolls 10, so they will overlap the mouth of the first curved repeater 12 and allow the ingot after its passage of the reversing-passes to be entered in the curved repeater 12, obviating the necessity of transfer-  
 55 ring the ingot to a separate pair of rolls, thereby so shortening the time of rolling that the ingot can be reduced in cross-section sufficiently to allow it to be controlled by a curved  
 60 repeater of three hundred and sixty degrees and then finished to accurate dimensions by continuous rolling at a single heating, not only saving in labor and time, but effecting a large

saving in metal by reducing the oxidation of the heated metal. 65

By my improved mill I take an ingot at its first heating, present it small end foremost to the passes of a two-high mill, reversing the mill at each successive pass, and at any desired even pass of the mill I deliver the rod or  
 70 bar to one or more curved repeaters, with the endwise movement of the bar reversed from the first pass and with the rolls running in one direction, subject the rod to a continuous reduction until the last pass of the rolls is  
 75 reached, from which the rod or bar is delivered to a curved section of a groove or track, by which the initial twist which may be imparted by any irregularity in the alinement of the rolls is checked, and the rod is then con-  
 80 ducted to a shear and cut into lengths, beginning at its sound end. The rolls B can be driven by any suitable connection with an engine or other motive power capable of being reversed in the usual manner. 85

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

1. A rolling-mill, consisting of a pair of two-high rolls having a series of grooves or passes for the continuous reduction of an ingot, a  
 90 straight conveyer by which an ingot can be presented to a portion of the passes in opposite directions, and one or more curved repeaters connecting the remaining passes in consecutive order, with one of the passes of  
 95 the rolls arranged to receive an ingot from said conveyer and deliver it to one of said curved repeaters, substantially as described.

2. In a rolling-mill, the combination of two-high rolls having grooves for the continuous  
 100 reduction of an ingot, a straight conveyer by which an ingot is presented to said rolls, and a curved repeater arranged to receive the ingot on the same side it is first presented to said rolls, whereby an ingot entering said rolls  
 105 with one of its ends foremost will be delivered to a curved repeater with its other end foremost, substantially as described.

3. The combination with two-high rolls having grooves for the continuous reduction of an  
 110 ingot, of a straight conveyer by which the ingot is presented to an even number of said grooves alternately on opposite sides of the rolls, and a curved repeater to receive the ingot from an even pass of said rolls and con-  
 115 duct it to the next consecutive pass, whereby the movement of the ingot in said curved repeater is reversed from its first passage through the rolls, substantially as described.

4. The combination with a pair of rolls hav-  
 120 ing a series of grooves or passes for the continuous reduction of the metal in cross-section, of a curved groove or repeater arranged to receive the rolled metal as it is delivered from the last pass in said series and conduct it away  
 125 from the rolls.

5. In a rolling-mill, the combination with a pair of rolls having coöperating grooves forming a pass for the rolled metal, of a delivery-groove or repeater arranged to receive the rolled metal as it leaves said pass and conduct it away from the rolls, said repeater having a straight section at its delivery end and a curved section between said straight section and the

roll-pass, whereby an initial twist imparted to the rolled metal by the rolls is checked, substantially as described. 10

Dated this 14th day of November, 1903.

JEROME R. GEORGE.

Witnesses:

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