

(No Model.)

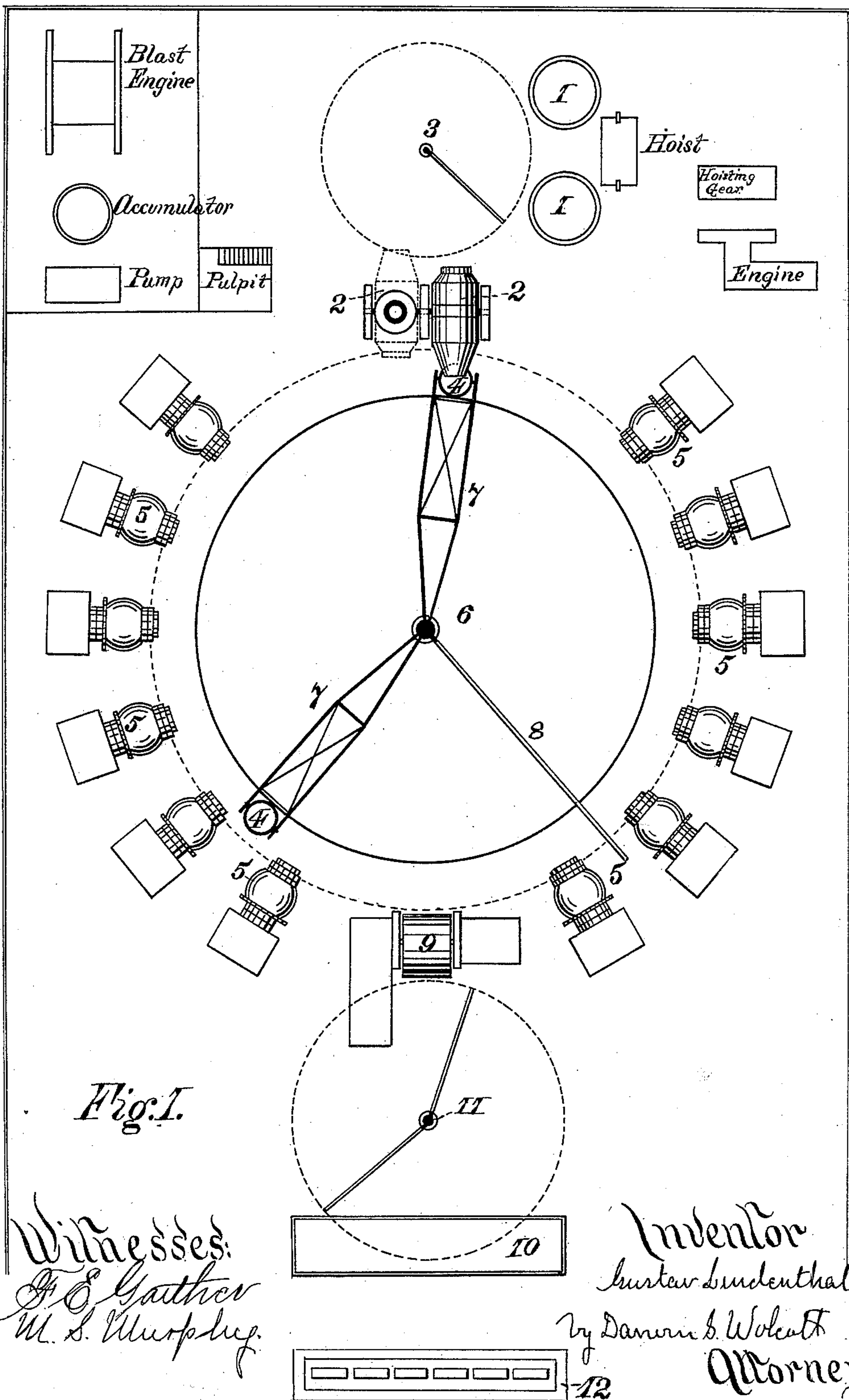
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PLANT FOR THE MANUFACTURE OF WROUGHT IRON.

No. 405,490.

Patented June 18, 1889.



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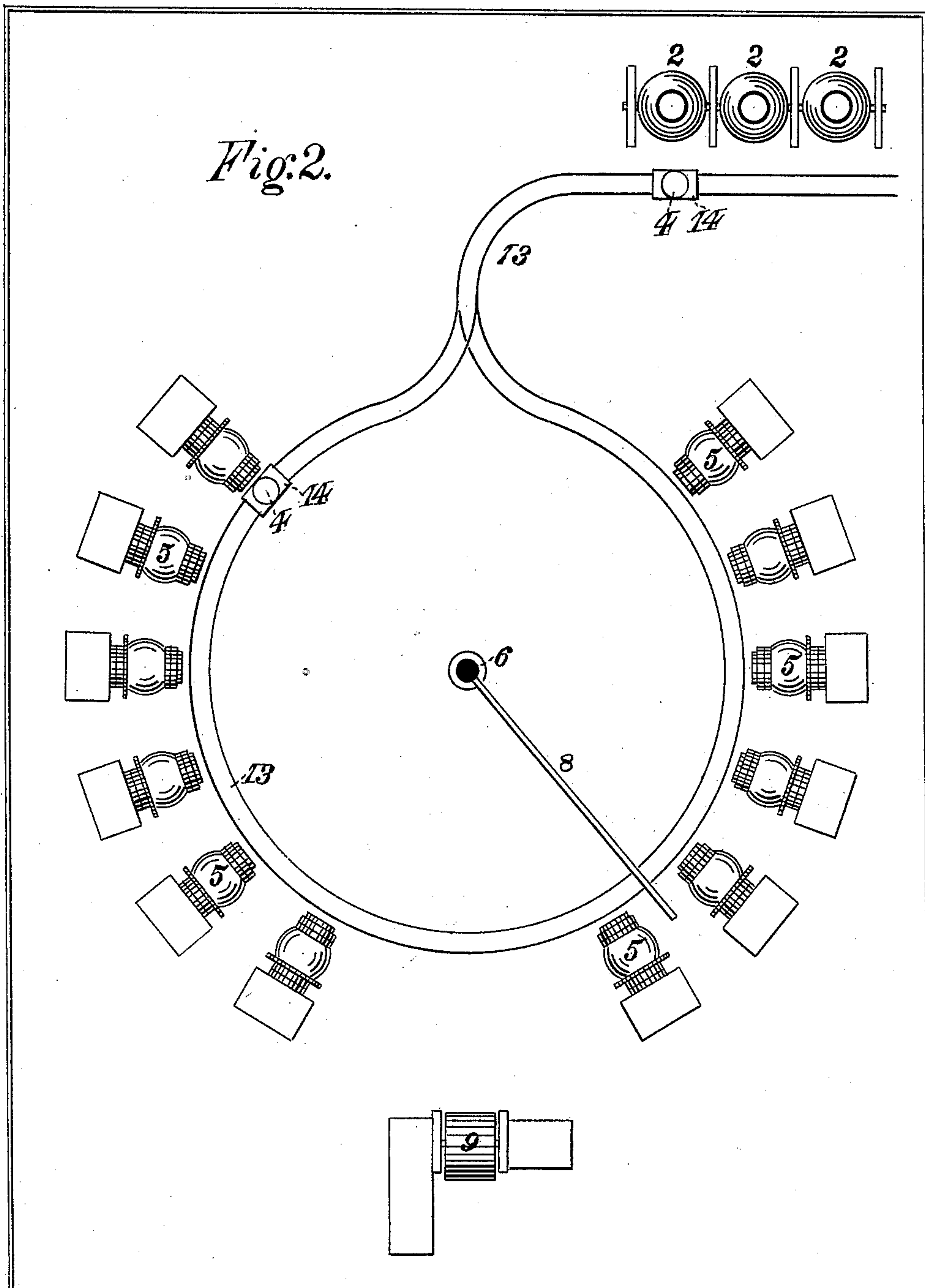
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WITNESSES:

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# UNITED STATES PATENT OFFICE.

GUSTAV LINDENTHAL, OF PITTSBURG, PENNSYLVANIA.

## PLANT FOR THE MANUFACTURE OF WROUGHT-IRON.

SPECIFICATION forming part of Letters Patent No. 405,490, dated June 18, 1889.

Application filed July 2, 1887. Serial No. 243,210. (No model.)

*To all whom it may concern:*

Be it known that I, GUSTAV LINDENTHAL, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Plants for the Manufacture of Wrought-Iron, of which improvements the following is a specification.

The invention described herein relates to certain improvements in plants for the reduction of pig metal to wrought-iron billets or muck bars. The processes involved in such a reduction are the refining, desiliconizing, and decarbonizing the pig metal, agglutinating the refined metal, removing the cinder from the agglutinated metal, and finally reducing the metal to muck bars or billets.

The object of the invention described herein is to so arrange the several furnaces, converters, and other apparatus that the several operations may be carried on successively and continuously without interference with each other.

In general terms, the invention consists in the relative arrangements of parts substantially as hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a plan view of the relative arrangement of the several parts. Fig. 2 is a similar view of a modified arrangement of the plant.

In the practice of my invention I provide two or more blast-furnaces, cupolas, or other suitable forms of melting-furnaces 1, so as to provide a continuous supply of molten metal. Each of these cupolas or melting-furnaces is provided with the necessary hoists for the material and blast-engines or blowers. Bessemer converters or open-hearth furnaces 2, for refining, desiliconizing, and decarbonizing the molten metal, are located within such proximity to the melting-furnaces as to be within the scope of a crane 3, whereby a ladle charged with molten metal from the melting-furnaces can be transferred to and its contents discharged into the converters or furnaces.

The converters or furnaces—two or more in number—are provided with the usual apparatus necessary for their operation. After

the metal has been refined in the usual manner in the converters or furnaces it is transferred to one or the other of the ladles 4, and by them carried to one of the puddling-furnaces 5, which are preferably of the rotary or other mechanical type. These puddling-furnaces and the converters are arranged in a circle having its center coincident with the axis of the crane 6, provided with two or more jibs 7, carrying the ladles 4, so that the molten charge can be readily transferred from the converters to the puddling-furnaces. After the metal has been dephosphorized and agglutinated by the operation of the puddling-furnaces the balls thus formed are transferred by means of forks depending from the jib 8 of the crane 6 to the squeezers 9, located in the same circle with the converters and puddling-furnaces. In lieu of the squeezers, which are preferably of the type known as the "Winslow," a steam-hammer or other compressing device may be employed for removing the cinder from the ball. The ball thus freed from the cinder is transferred from the squeezers to the heating-furnace 10 by the crane 11, and after receiving a "wash-heat" in the furnace 10 is transferred to a train 12 of blooming or muck rolls, where it is reduced to billets or muck bars.

In lieu of arranging the converters, puddling-furnaces, and squeezers in a circle, as shown in Fig. 1, the converters or squeezers, or both, may be located outside of such circle, as shown in Fig. 2. When the converters are located outside of the circle, I provide a track 13, passing in front of the converters, thence to the circle on which the puddlers are arranged, around such circle in front of the puddlers and back to the converters, and on this track are mounted cars 14, carrying the ladle 4.

When the above-described arrangement of plant is employed, only the jib 8, carrying the forks for removing the balls, is required. In case the squeezers are located outside of the circle of the puddling-furnaces the ball is deposited by means of forks upon a buggy—such as is commonly employed in rolling-mills—for transference to the squeezers.

In operating my improved plant, the molten



metal from one of the furnaces 1 is transferred to one of the converters 2 by the crane 3, carrying a suitable ladle, and while this charge is being treated in the converter another charge from the other melting-furnace is transferred in a similar manner to the other converter. In this manner both converters can be kept in continuous operation. After the metal in one of the converters has been treated as above described, its charge is poured into one of the ladles 4 in the arms 7 of the crane and by it distributed to one or more of the puddling-furnaces 5. As soon as the charge in the other converter 2 has been treated, it is transferred by the other ladle 4 to one or more of the puddling-furnaces 5. As soon as the metal has been agglutinated in the puddling-furnaces, the ball thus formed is removed by the tongs on the jib 8 from the furnace and transferred thereby either to the squeezers or other compressing device. The cinder having been removed by the action of the squeezers, the balls are carried by the crane 11 to the furnace 10, where they are given a wash-heat, and then transferred to the train 12 of billet or muck rolls.

In the term "refining-furnace," as employed herein, I include either a Bessemer converter, an open-hearth furnace, or any other known form or construction of furnace capable of use in refining, desiliconizing, and decarbonizing molten metal.

I claim herein as my invention—

1. In a plant for the manufacture of wrought-iron billets or muck-bars, the combination of one or more refining-furnaces, a series of two or more puddling-furnaces arranged on the arc of a circle, a ladle movable from the refining-furnaces to and along the line of the puddling-furnaces, and a crane located in the center of the circle of the puddling-furnaces and provided with a jib adapted to swing around in the line of the puddling-furnaces, substantially as set forth.

2. In a plant for the manufacture of

wrought-iron billets or muck-bars, the combination of one or more refining-furnaces, a series of two or more puddling-furnaces arranged on the arc of a circle, a ladle movable from the refining-furnaces to and along the line of the puddling-furnaces, a crane located in the center of the circle of the puddling-furnaces and provided with a jib adapted to swing around in the line of the puddling-furnaces, and a squeezer located within the sweep of the crane-jib, substantially as set forth.

3. In a plant for the manufacture of wrought-iron billets or muck-bars, the combination of a crane, one or more melting-furnaces, one or more refining-furnaces, the melting and refining furnaces being located in such relation to each other and to the crane that the metal may be transferred from one to the other by said crane, two or more puddling-furnaces arranged on the arc of a circle passing through the refining-furnaces, a crane located at the center of said circle, and a ladle carried by said crane, substantially as set forth.

4. In a plant for the manufacture of wrought-iron billets or muck-bars, the combination of one or more melting-furnaces, one or more refining-furnaces, a crane so located as to be able to transfer the metal from the melting to the refining furnaces, a series of two or more puddling-furnaces, a squeezer, the puddling-furnaces and squeezer being arranged on the arc of a circle passing through the refining-furnaces, and a centrally-located crane provided with suitable jibs, whereby the metal may be transferred from the refining-furnaces to the puddling-furnaces and thence to the squeezer, substantially as set forth.

In testimony whereof I have hereunto set my hand.

GUSTAV LINDENTHAL.

Witnesses:

DARWIN S. WOLCOTT,  
J. LINCOLN RALPH.