

(No Model.)

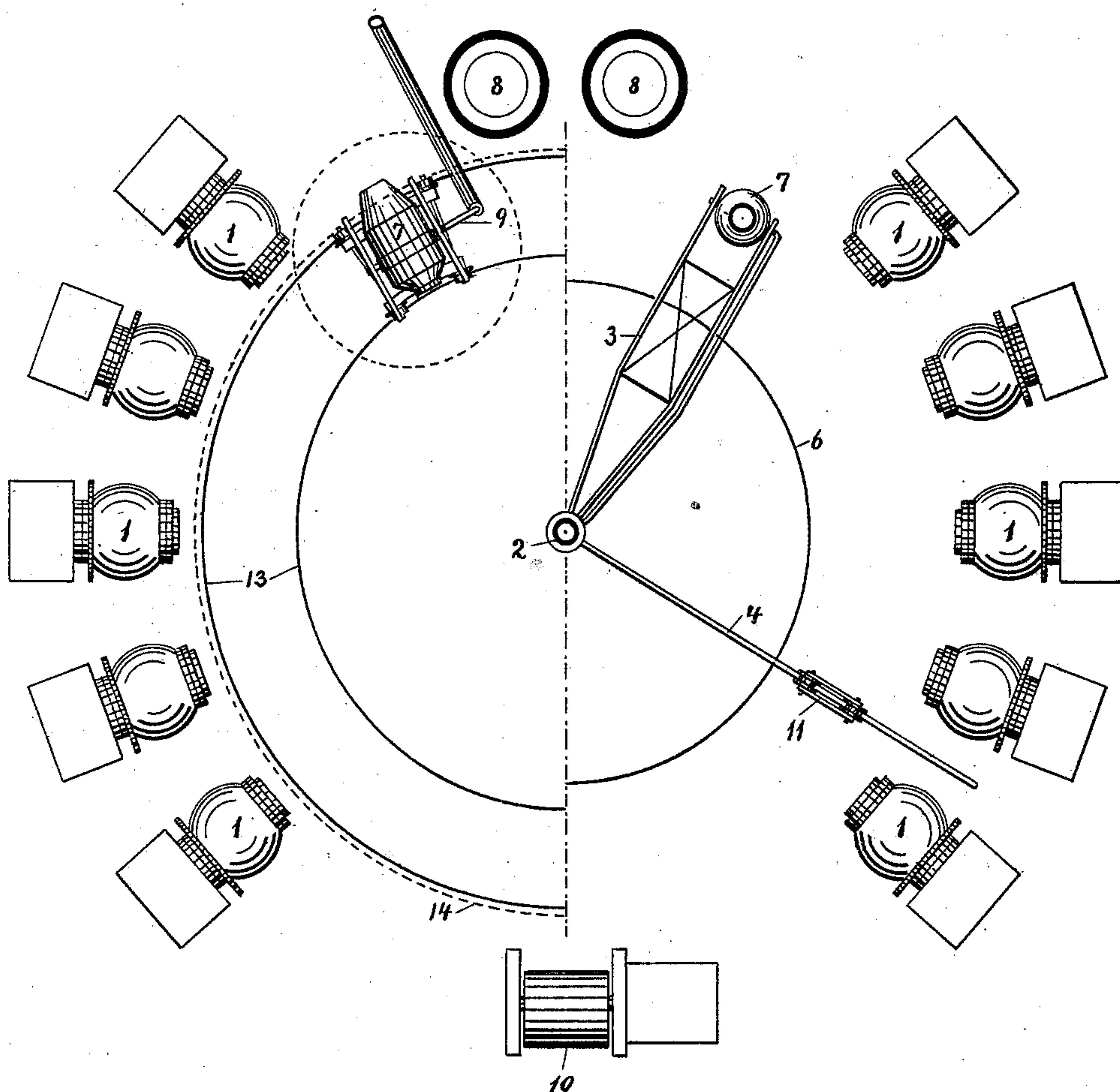
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G. LINDENTHAL.
METALLURGICAL PLANT.

No. 405,491.

Patented June 18, 1889.

Fig:1



WITNESSES:

C. M. Clarke.
H. L. Gill.

INVENTOR,

Gustav Lindenthal
 by Darwin S. Wolcott
 Att'y.

(No Model.)

2 Sheets—Sheet 2.

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METALLURGICAL PLANT.

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Fig: 2

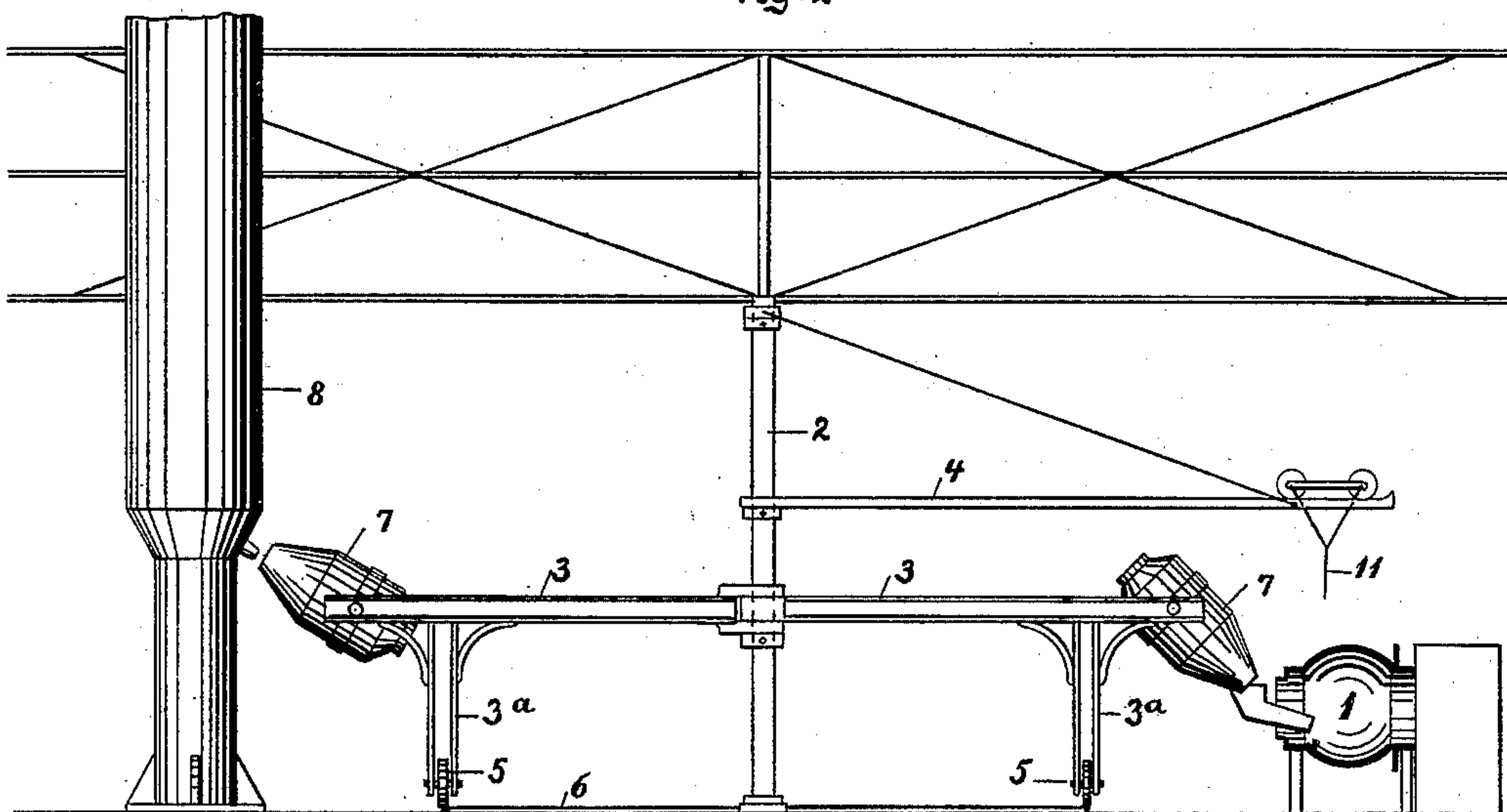
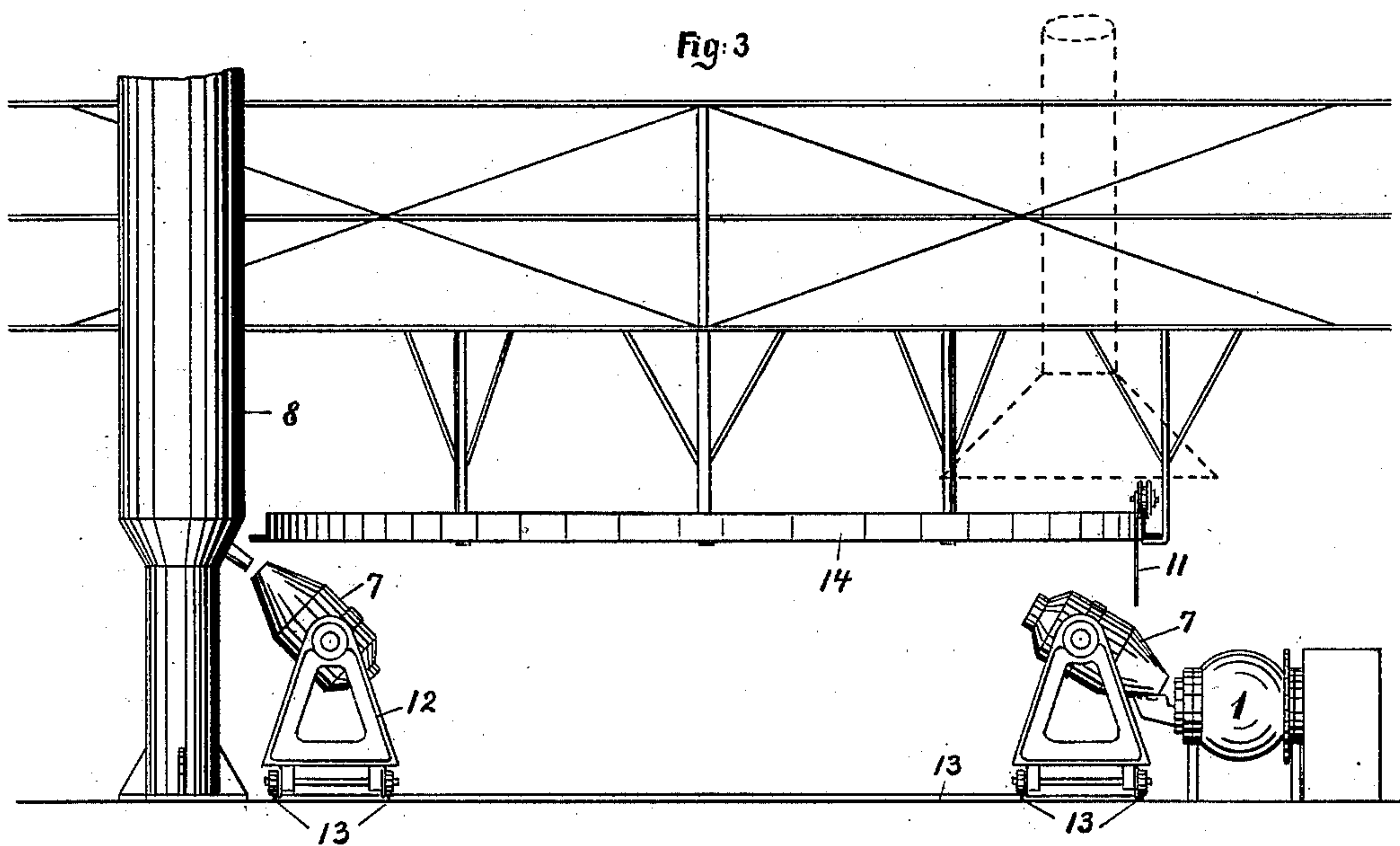


Fig: 3



WITNESSES:

C. M. Clarke
H. L. Gill

INVENTOR,

Kurt Lindenthal
by *Danun S. Wolcott*

Att'y.

UNITED STATES PATENT OFFICE.

GUSTAV LINDENTHAL, OF PITTSBURG, PENNSYLVANIA.

METALLURGICAL PLANT.

SPECIFICATION forming part of Letters Patent No. 405,491, dated June 18, 1889.

Application filed September 23, 1887. Renewed January 4, 1889. Serial No. 295,466. (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 Metallurgical Plants, of which improvements the following is a specification.

In an application filed by me July 2, 1887, and numbered serially 243,210, I have described and claimed a patent wherein provision is made for the successive treatment of metal in melting, converting, and puddling furnaces, and its orderly transference from one to the other of these furnaces, and finally to squeezers or other initial devices in a plant for the reduction of the metal to wrought-iron billets or muck-bars.

The object of the invention described herein is to provide for the reduction of ore or pig metal to the form of wrought-iron billets or muck-bars by means of such an arrangement of furnaces as will not only greatly facilitate such an operation, but will also lessen the original cost of the plant necessary therefor and of its subsequent operation.

In general terms the invention consists in the relative arrangement and combination of furnaces and other elements or devices, all as more fully hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a plan view of a plant embodying my invention, one half thereof showing one arrangement of the transporting mechanism and the other half a modification thereof. Figs. 2 and 3 are views in elevation showing, respectively, the two forms of the transporting mechanism.

In the practice of my invention I arrange a series of two or more puddling-furnaces 1, preferably of the mechanical type, radially on the arc of a circle, as shown in Fig. 1, the charging and discharging end being accessible from within the circle. In the center of the said circle is located the mast 2 of a crane, whose jibs 3 and 4 are so constructed that any device carried thereon can be brought into close proximity to the mouths of the puddling-furnaces or inserted therein. The outer end of the jib 3 is supported by a frame

or standard 3^a, provided at its lower end with wheels 5, running on a circular track 6. On this jib 3 is mounted in suitable bearings a converting-vessel 7, preferably of the Bessemer type. In order to avoid the use of a ladle for transferring molten metal from the blast or melting furnaces 8 to the converters, I arrange such furnaces 8 on the arc of the circle with the puddling-furnaces, or in such other position relatively to the sweep of the converter that the molten metal may be run directly into the converter, any suitable trough or spout being employed for that purpose.

At any suitable point or points in the path of the converter as it is moved from the blast or melting furnaces to the puddling-furnaces is arranged a pipe 9, leading from a blast engine or fan, said pipe being provided with suitable devices or mechanism whereby it may be detachably connected to the hollow trunnion of the converter. After the metal has been purified and brought approximately to nature by the operation of the blast the converter is swung in front of one of the puddling-furnaces and a suitable portion of the purified and refined metal poured therein. The number of puddling-furnaces charged from a converter at one time is of course dependent on the quantity of metal in the converter and the quantity discharged into the puddling-furnaces, which is regulated in accordance with the size of blooms which it is desired to form. After the metal has been brought to nature and balled by the usual treatment in the puddling-furnaces the balls or blooms are removed therefrom and transferred directly to the squeezers 10, or else to a buggy, by suitable tongs attached to rods 11, which are so connected to the jib 4 of the crane as to be movable therealong, and hence can be easily moved along the line of the furnaces and thrust therein for the purpose of grasping a ball or bloom, and then around the squeezers. These squeezers are preferably located on the arc of a circle with the melting and puddling furnaces, but may be arranged without such circle, in which case the ball or bloom is placed by the tongs on a suitable buggy and by it carried to the squeezers. When the melting and puddling

furnaces and the squeezers are all arranged on the arc of a circle, the melting-furnaces and the squeezers are preferably located at opposite ends of the row or series of puddling-furnaces; or when a double row or series of puddling-furnaces are employed the melting-furnaces and squeezers are located diametrically opposite each other, so that both shall be equally accessible from both series of puddling-furnaces.

In lieu of the central crane, with its jibs 3 and 4, and as a full equivalent thereof, the converter may be mounted on a truck 12, suitable rails 13 therefor being arranged along the line of the melting and puddling furnaces, and the tongs-carrying rods 11 suspended from a circular overhead track 14 so arranged that the tongs may be moved to and fro along the line of puddling-furnaces and squeezers.

Suitable devices or mechanism are employed in connection with either the jib 3 or the truck 12 for tilting the converter in the manner customary in the Bessemer operation.

When the converter is mounted on the jib of a crane, the blast-pipe 9 is carried up the mast of the crane and out along the jib to the hollow trunnion.

While preferring to employ a crane provided with two jibs for transporting the converter and tongs along the line of furnaces and squeezers as being the more practical and economical means, the rails and trucks shown in Fig. 3 may in some instances be more advantageously employed; hence I do not limit myself herein to either of the constructions above referred to; but in so far as relates to mechanism for transporting the converter from point to point either may be employed or any other known substitute.

The arrangement of melting and puddling furnaces hereinbefore described permits of the use of two or more converters and two or more pairs of tongs, said converters passing in the same direction one after the other along the line of melting and puddling furnaces, and avoids the use of switches or turn-outs when tracks are used, and permits of all of the converters being mounted on jibs radiating from a common mast when cranes are employed. The same statement of construction and function is also applicable to the pairs of tongs. Those skilled in the art will readily understand that in such an arrange-

ment the several operations can proceed in orderly succession without interference with each other.

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 blast or melting furnaces, a series of two or more puddling-furnaces, the melting and puddling furnaces being arranged on the arc of a circle, and a converter portable along the line of said furnaces, whereby a charge of molten metal may be poured directly into a converter from the melting or blast furnace and after purification therein poured directly into one or more 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 blast or melting furnaces, a series of two or more puddling-furnaces, the melting and puddling furnaces being arranged on the arc of a circle, and a converter and tongs portable along the line of the melting and puddling furnaces, substantially as set forth.

3. In a plant for the manufacture of wrought-iron billets or muck-bars, the combination of one or more blast or melting furnaces, a series of two or more puddling-furnaces, the melting and puddling furnaces being arranged on the arc of a circle, a converter portable along the line of the melting and puddling furnaces, a squeezer located on the arc of a circle with the furnaces, and tongs portable along the line of the puddling-furnaces and squeezer, substantially as set forth.

4. In a plant for the manufacture of wrought-iron billets or muck-bars, the combination of one or more blast or melting furnaces, a series of two or more puddling-furnaces, a squeezer, said furnaces and squeezer being arranged on the arc of a circle, a crane provided with swinging jibs located in the center of said circle, and a converter and tongs mounted on the jibs of the crane and movable along the line of the furnaces and squeezer, substantially as set forth.

In testimony whereof I have hereunto set my hand.

GUSTAV LINDENTHAL.

Witnesses:

W. B. CORWIN,
DARWIN S. WOLCOTT.