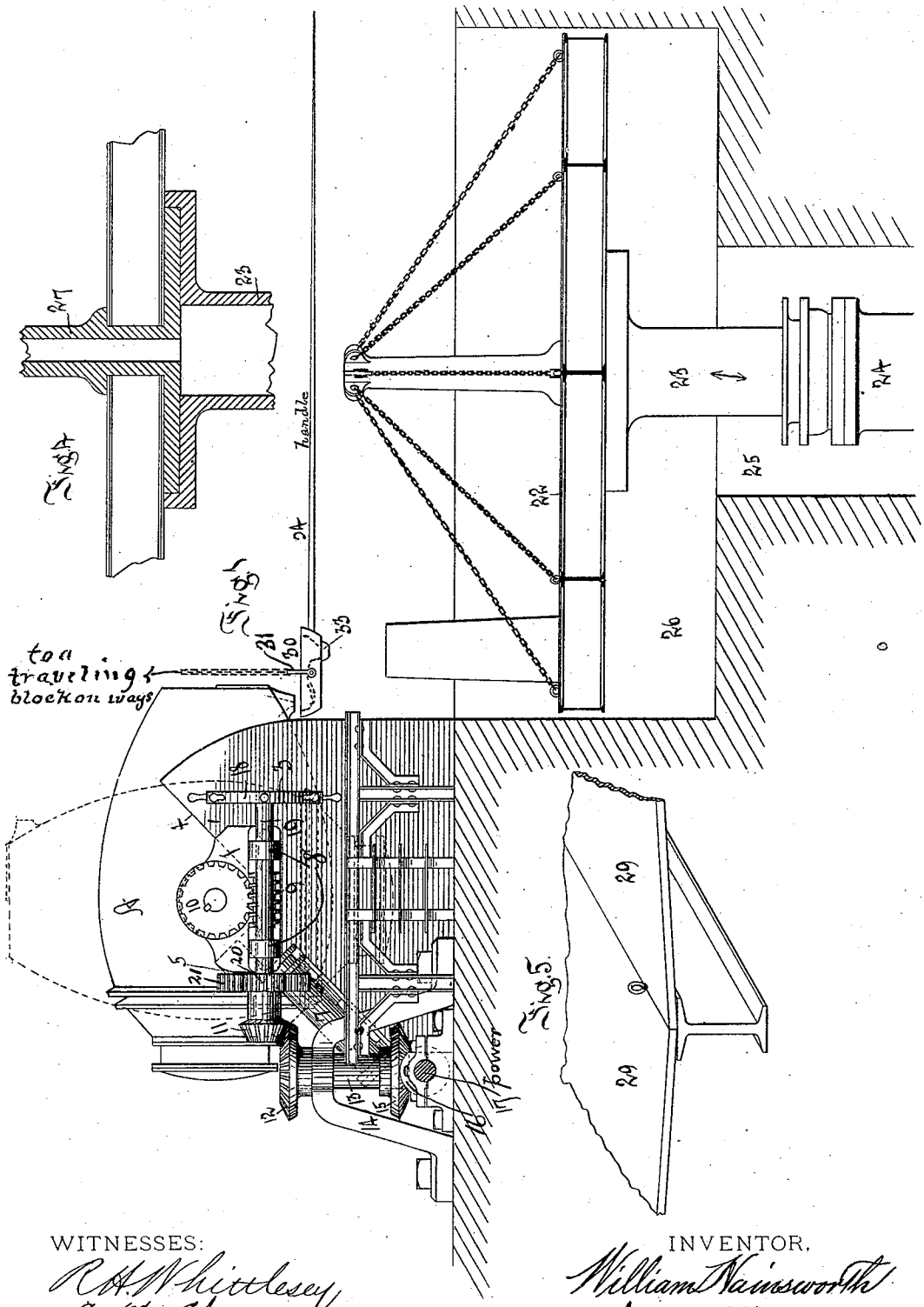
(No Model.) 3 Sheets—Sheet 1.

W. HAINSWORTH.

BESSEMER PLANT.

No. 309,712. Patented Dec. 23, 1884.



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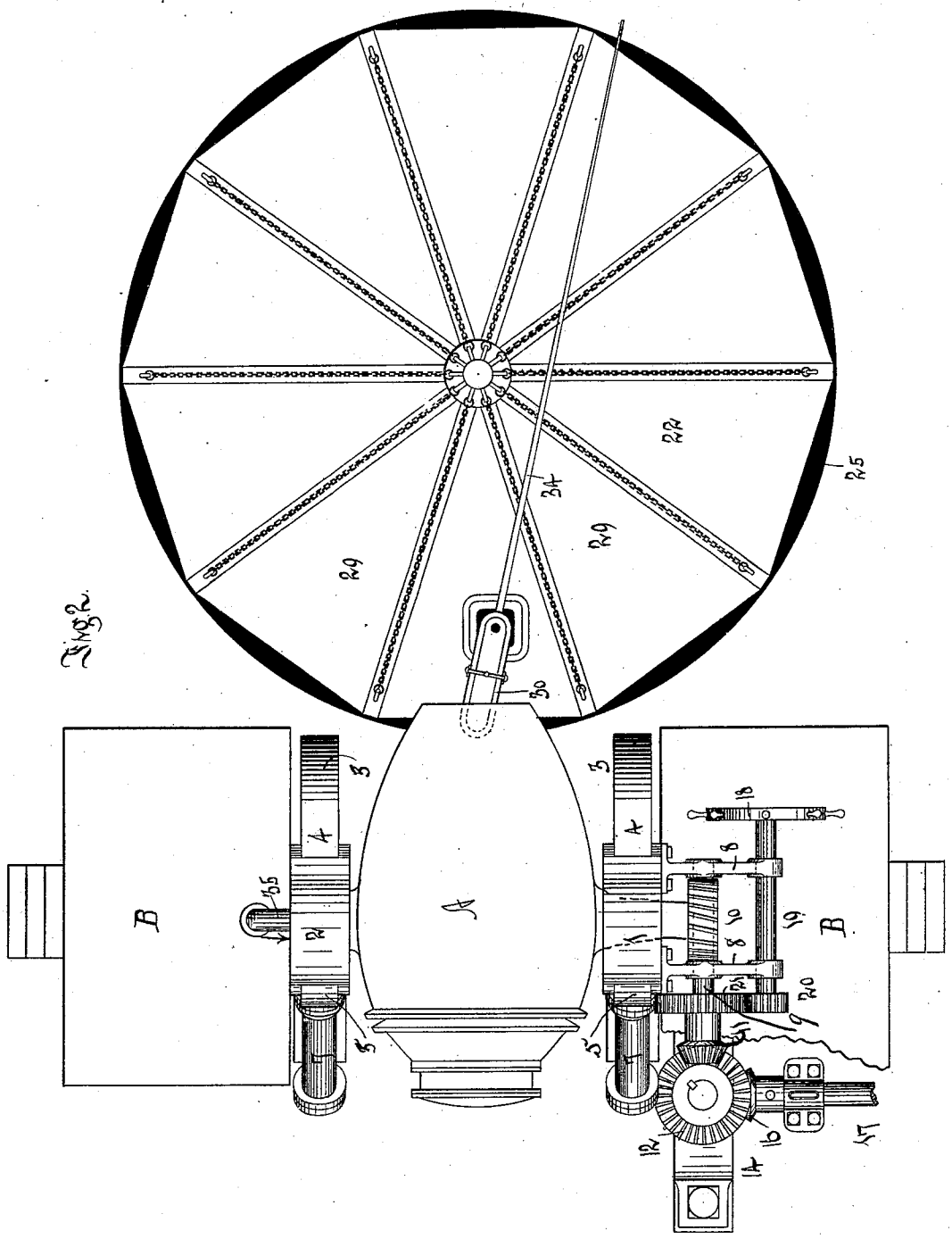

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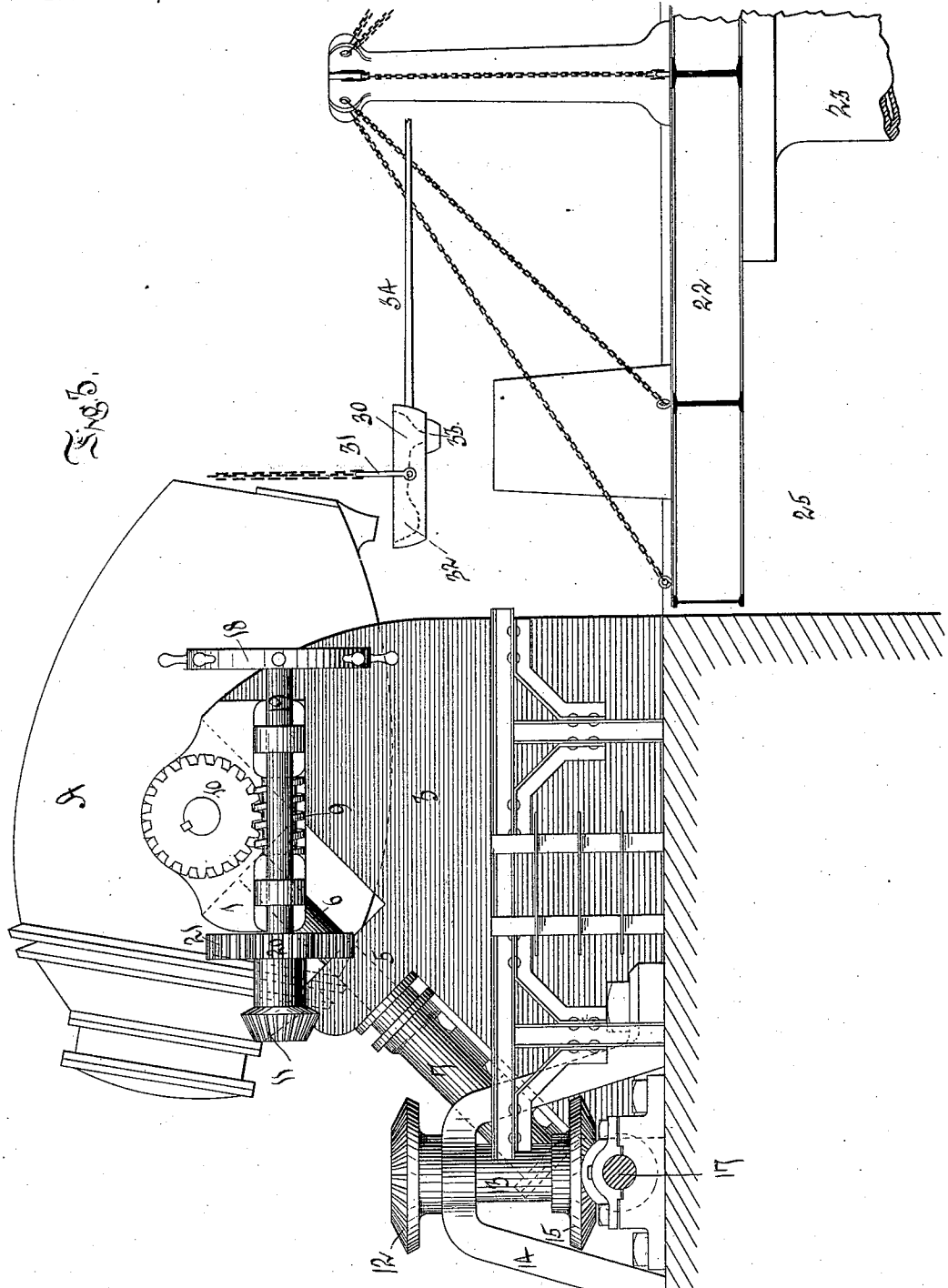

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UNITED STATES PATENT OFFICE.

WILLIAM HAINSWORTH, OF PITTSBURG, PENNSYLVANIA.

BESSEMER PLANT.

SPECIFICATION forming part of Letters Patent No. 309,712, dated December 23, 1884.

Application filed April 21, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HAINSWORTH, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Bessemer Plant, of which improvements the following is a specification.

In the accompanying drawings, which make part of this specification, Figure 1 is a view in side elevation of my improved Bessemer plant at the beginning of the casting operation. Fig. 2 is a plan view of the same. Fig. 3 is a view in side elevation of the plant during the pouring operation. Figs. 4 and 5 are detail views of the mold-table.

In making castings of Bessemer metal, which is now substituted in many instances for cast-iron, the varying heights of the molds in which the metal is cast is a great source of trouble and delay. These molds vary in height, from the small pinion-mold to the high-roll and ingot molds, and it is frequently necessary or desirable to cast both articles during the same heat. In such a case it is of course necessary that either the vessel containing the metal or the mold into which the metal is to be poured should be raised or lowered. If the metal is poured into the molds from a ladle such as is used in a Bessemer plant, the ladle can be raised or lowered and swung around from mold to mold with comparative ease and rapidity; but when the metal is poured direct from the converter into the mold, which is the preferable method of casting, as the metal can be kept at a high temperature in the converter, great difficulty is encountered in presenting a succession of molds differing in height at a proper pouring-distance from the mouth of the converter, or a runner-box leading therefrom.

In pouring from the converter into the molds it is difficult to keep one end of the runner-box in position under the nozzle of the converter and the other end over the spine of the mold, for the reason that in tipping the converter to discharge the metal the nozzle is changing its position, not only in a vertical but also in a horizontal direction, as it moves in the arc of a circle whose center is in a projection of the axis of the trunnions.

The object of my invention is to so construct and combine the various parts of a Bessemer plant that the metal can be poured from the converter into a succession of molds varying greatly in height with ease and rapidity.

The converter A, of the usual form and construction, is journaled in the movable bearing-blocks 1 and 2, which are mounted on the inclined ways 4 of the standards 3. These inclined guideways 4 are provided with a shoulder or stop, 5, against which the bearing-blocks rest when the converter is not in use, or during the blowing operation. Through the stops 5 are formed holes for the passage of the pistons 6 of the hydraulic rams 7, located in a recess in the rear of the stops. The front ends of the pistons bear against the bearing-blocks 1 and 2, and when the rams are operated move the bearing-blocks up and down the inclined ways 4, thereby moving the converter in a vertical and horizontal direction. To the bearing 1 is bolted the bracket 8, in which is mounted the worm 9, meshing with the worm-wheel 10, secured to one of the trunnions of the converter. On the end of the shaft of the worm is secured the miter 11, adapted, when the bearing-blocks are lowered against the stops 5, to mesh with the miter-wheel 12, secured to the vertical shaft 13, mounted in the frame 14. On the lower end of the shaft 13 is secured a miter-wheel, 15, meshing with another miter-wheel, 16, secured on the power shaft 17, which is driven by an engine or any other suitable means. The converter is turned by the mechanism above described only during the usual manipulations of the converter for receiving the charge and converting the metal. When the molds are to be filled, the converter is turned by the hand-wheel 18, which is secured to a shaft, 19, mounted in bearings in the bracket 8 outside of the worm 9. On this shaft 19 is secured the pinion 20, adapted to mesh with the gear-wheel 21, keyed to the worm-shaft, as shown. During the pouring operation the bearing-blocks 1 and 2 are gradually moved up the inclined ways 4, for the purpose of counteracting the downward and inward movement of the nozzle during the turning of the converter, and thereby retaining it in the same position while in both a horizontal and vertical position.

As the pouring-nozzle of the converter, which

is formed in the side of the converter, is held in one position, it is necessary that the molds to be filled should, in being brought to the converter, be raised or lowered according to their respective heights. To this end, and also for the purpose of rapidly presenting a series of molds, the latter are arranged on a revolving table, 22, mounted on the end of the piston 23 of the hydraulic ram 24. This ram is placed in a pit, 25, formed in the center of the casting-pit 26, in which the table 22 is placed, the converter being mounted at the edge of the pit 26, as shown. The table 22 consists of a series of I-beams arranged and secured radially around the center post, 27, the outer ends of the beams being supported by the chains 28, extending from the top of the center post, as shown. On these I-beams are placed the V-shaped plates 29, forming the floor of the table. On this table are placed the molds to be filled, in any desired order, the higher molds being preferably arranged together, and the low molds together, and the intermediate molds between. This arrangement is not vital, as the table can be easily adjusted up and down by the hydraulic ram. The table can be revolved by hand, or by any desired mechanical means—as, for instance, a worm and gear connection between the piston and the table.

To guide and regulate the flow of metal from the converter into the mold, I employ the runner-box 30, which is pivotally hung in the bail 31, attached to a chain suspended from a traveling block mounted on elevated ways, secured in any convenient manner above the converter. This runner-box is lined with ganister and fire-clay, and is provided at the receiving end with a basin, 32, of some considerable capacity, and at the opposite end with a nozzle or spout, 33. To the spout end of the box is secured the handle 34, by which the runner-box is manipulated.

In using this plant the bearing-blocks 1 and 2 are lowered until they rest against the stops 5 and the miter-wheel 11 is in gear with the miter-wheel 12. The converter is then turned down to receive its charge of molten metal by rotating the power-shaft 17. After the converter has been charged the motion of the power-shaft is reversed and the converter turned up to the blowing position, and as soon as the steel has been produced the converter turned to the pouring position shown in Fig. 1. The molds having been arranged on the table 22, the latter is raised or lowered, as may be necessary, according to the height of the mold to be filled, which is then brought into proper pouring relation with the nozzle of the converter. The runner-box, if used, is then adjusted so as to direct the metal from the converter to the mold. The hand-wheel 18 is now rotated, so as to further tip the converter to cause the metal to flow therefrom. As the converter is gradually turned down in the casting operation, it is raised and pushed forward by the rams 7 to counteract the downward and inward movement of the nozzle during the turning of the converter above described. After the filling of one mold the table is turned so as to present the next mold at the pouring position, and the table is at the same time raised or lowered, should the height of the succeeding mold be materially different from that of the mold just filled.

The blow-pipe 35 should be constructed so as to be readily detached from the hollow trunnion when the converter is raised; or the vertical arm of the blow-pipe may be constructed with a telescopic joint and adapted to turn on the horizontal part of the blow-pipe leading to the blowing-engine. On each side of the converter are arranged platforms, on which the workmen stand while turning the converter and performing other necessary operations during the conversion of the metal. The converter is also provided with a side pouring-nozzle and a dam-plate over the mouth of the converter, as described and claimed in an application No. 122,535, filed February 29, 1884.

I claim herein as my invention—

1. In a Bessemer plant, a converter in combination with mechanism for turning the converter on its trunnions, and mechanism for raising and moving forward the converter while being turned, substantially as set forth.

2. In a Bessemer plant, a converter in combination with a rotary mold-table, and mechanism for raising and lowering said table, substantially as set forth.

3. In a Bessemer plant, a converter in combination with mechanism for turning the converter on its trunnions, mechanism for moving the converter up and forward while being turned on its trunnions, a rotary mold-table, and mechanism for raising and lowering said table, substantially as set forth.

4. In a Bessemer plant, a converter in combination with the movable bearing-blocks, standards 3, having inclined guideway, and the hydraulic rams 7, substantially as set forth.

5. In a Bessemer plant, the converter in combination with the movable bearing-blocks, standards 3, having inclined guideways, the hydraulic rams 7, and hand mechanism for rotating the converter, substantially as set forth.

In testimony whereof I have hereunto set my hand.

WILLIAM HAINSWORTH.

Witnesses:

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OLIVER FULTON.