

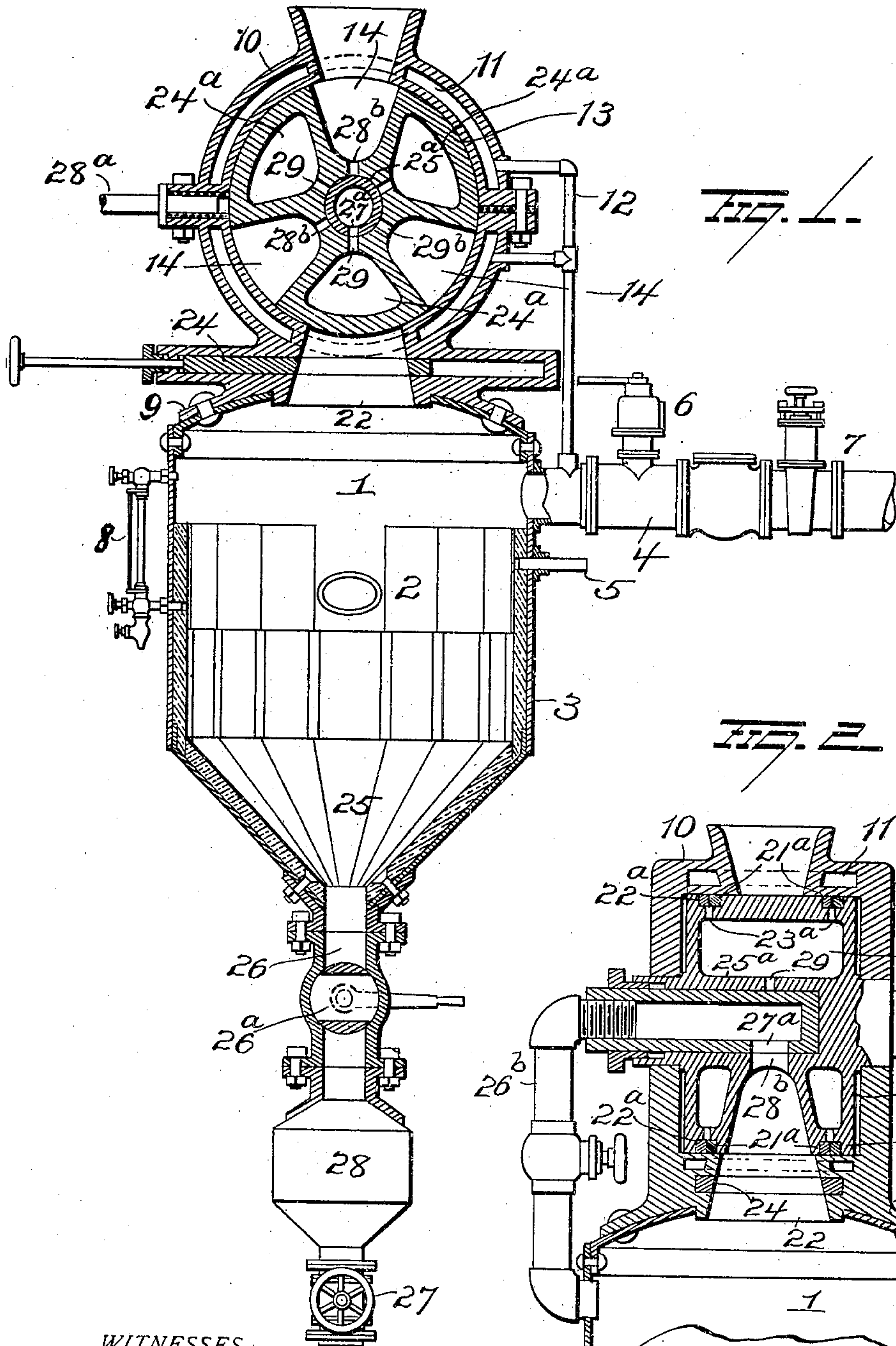
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G. MITCHELL.

APPARATUS FOR GENERATING STEAM FROM HOT SLAG.

APPLICATION FILED DEC. 13, 1904.



WITNESSES

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APPARATUS FOR GENERATING STEAM FROM HOT SLAG.

No. 809,123.

Specification of Letters Patent.

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Application filed December 13, 1904. Serial No. 236,746.

To all whom it may concern:

Be it known that I, GEORGE MITCHELL, of Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Apparatus for Generating Steam from Hot Slag; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in apparatus for generating steam from hot slag, the object being to provide simple and efficient apparatus for transferring molten slag from a smelting-furnace into a steam-generating apparatus and utilizing the heat contained in the molten slag for generating steam.

The invention consists in certain features of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical section of an apparatus embodying my improvement. Fig. 2 is a sectional view of the rotary slag-conveyer, taken at right angles to Fig. 1.

1 represents a steam-generator, which may be of any desired form and construction. It is provided with detachable metal plates or strips 2, which serve to prevent any undue wear of the shell 3 of the generator.

4 represents the steam-outlet pipe; 5, the feed-water pipe; 6, a safety-valve; 7, a valve for controlling the flow of steam, and 8 a water-gage.

To the top of the generator is secured a base-plate 9, having a steam-jacketed cylinder 10 cast integral therewith or it might be made as a separate casting and bolted to the base-plate. Cylinder 10 is provided with steam-chambers 11, to which steam is furnished by a pipe 12, leading from the boiler. The upper end of the cylinder is provided with a conical feed-chute, through which molten slag is conducted from the smelting-furnace. Within the cylinder is mounted a rotary slag-carrier 13, having a horizontal axis of rotation and provided with three slag-receptacles 14, situated equidistant apart.

The slag-carrier is made hollow and provided with sectional steel packing-rings 21^a 22^a, made in segments to break joints, as is usual in rotary engines. These rings are forced outwardly by steam entering through open-

ings 23^a, which form a communication between steam-chamber 24^a in the carrier and the rear surface of the packing-rings. Hence the packing-rings are always maintained against the inner surface of cylinder 10 by steam-pressure exerted against the rear surface of the packing-rings. The rotary slag-carrier is journaled on a hollow journal 25^a, into which steam is admitted from the boiler through a pipe 26^b. Hollow journal 25^a is provided with a long narrow opening 27^a in its lower side, which registers with a correspondingly-shaped opening 28^b, formed in the lower end of each one of the slag-receptacles when the latter are moved into position for discharging a charge of molten slag into the generator and also registers with a similar opening 29, which communicates with the steam-chamber in the interior of the hollow slag-carrier. The object of this construction is twofold, viz: First, whenever a charge of molten slag is moved into position to be discharged into the generator steam-pressure will be exerted on the upper end of the charge and cause the charge to be quickly forced into the generator. At all other times the openings 28^b are closed by the outer surface of the hollow journal. Second, whenever one of the openings 29 is brought into alinement with the opening 27^a in the journal steam will be supplied to the hollow chamber in the slag-carrier, which will serve to force the steam-packing rings tightly against their seat on the interior of the cylinder 10. A slide-valve 24 is provided for crossing the generator when it is desired to clean or repair the rotary slag-carrier or any of its parts. The lower end of the generator is constructed with a conical portion 25, to which is attached a discharge-pipe 26, having valves 26^a and 27 and an intermediate chamber 28. A steam-escape pipe 28^a is attached to cylinder 10 for carrying steam to a feed-water chamber. (Not shown.)

The apparatus operates as follows: When the rotary slag-carrier is in the position shown in Fig. 1 and in which the open mouth of one of the slag-receptacles registers with the feed-spout, molten slag from a smelting-furnace is introduced into the slag-receptacle until it is nearly full. It will be observed that the mouth of the slag-receptacle is slightly larger in diameter than that of the lower and discharge end of the feed-spout. This construction is adapted to prevent the molten slag from coming into contact with the pe-

riphery of the rotary slag-carrier, it being highly desirable to prevent the lodgment of any slag on the periphery of the rotary slag-carrier, as it would seriously interfere with its operation. After one receptacle has been filled the slag-carrier is partly rotated, so as to bring the next succeeding receptacle into alinement with the feed spout or chute, and in this way the several slag-receptacles are successively filled with molten slag. When the filled receptacles are brought into alinement with the discharge-spout 22, the molten charge of slag is discharged into the generator, (being forced out of the receptacle by steam entering behind the charge through port 28^b,) and the instant the molten slag strikes the water therein the slag is comminuted and granulated and transformed into small particles, which gather and are collected in the lower and conical end of the generator. The heat stored in the slag is thus quickly transmitted to the water and serves to convert the latter into steam. While the charge of molten slag is being moved from the feed-spout to the discharge-opening, it is kept from chilling by the steam-jacketed cylinder 10. After a charge of slag has been discharged into the generator the empty receptacle will be filled with steam, which will be trapped in the receptacle when the latter is moved past the discharge-opening; but when the mouth of the receptacle with a charge of steam trapped therein is moved over the open end of the steam-escape pipe 28^a the confined steam will escape through pipe 28^a and be conveyed by it into a feed-water heater. When one of the slag-receptacles is in a position to be filled, the discharge-opening in the generator will be closed and prevent any escape of steam from the generator, the rotary slag-carrier serving the purpose of not only carrying the molten slag from the feed-chute to the generator, but also as a rotary valve to prevent the escape of steam from the generator.

The finely-divided slag which collects in the bottom of the generator can be discharged therefrom by opening the valve 26^a and permitting the slag to fall into chamber 28, and when the latter is filled the valve 26^a is closed and the valve 27 opened, and the contents of chamber 28 are discharged into any suitable receptacle or conveyer.

— Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a steam-generator having a feed-opening in its top and a casing over said generator and communicating therewith through said feed-opening, of a hollow slag-carrier having a series of radial slag-receptacles, a spout at the top of the casing, packing-rings between the slag-carrier and casing and means for admitting

steam into the hollow slag-carrier and subjecting the packing to the pressure thereof.

2. The combination with a steam-generator having a feed-opening in its top, of a slag-carrier over said feed-opening and having a horizontal axis of rotation, said carrier having a series of radiating slag-receptacles, each having a steam-duct in its bottom and means for forcing steam outwardly through said ducts to eject the slag.

3. The combination with a steam-generator having an opening in its top, of a hollow rotary slag-carrier having a series of slag-receptacles and a chamber within the carrier, a casing inclosing the carrier, packing-rings on the carrier arranged to receive steam-pressure from said chamber, ducts communicating with said chamber in the carrier, a tubular hub for the carrier, central ducts connecting said tubular hub with the bottoms of the slag-receptacles and with the chamber in the slag-carrier, a hollow journal on which the carrier rotates, said hollow journal having a port to register successively with the central ducts, and means for admitting steam to the hollow journal.

4. The combination with a steam-generator having an inlet-opening in its top, and a cylindrical casing over the same provided with an inlet-opening in its top of a rotary slag-carrier mounted in said casing and provided with a series of radial slag-receptacles, said carrier provided with a tubular hub having ports communicating with the slag-receptacles, and a stationary steam-pipe in said tubular hub and having a port in its bottom to register successively with the ports which communicate with the slag-receptacles.

5. The combination with a steam-generator having an inlet-opening in its top, and a casing over said opening, of a hollow rotary carrier mounted in said casing and provided with a series of radial slag-receptacles, said hollow carrier having peripheral grooves communicating with the interior of the carrier, packing-rings in said grooves, a tubular hub for said carrier, a stationary steam-pipe disposed within said tubular hub, said hub having a series of ports communicating with the interior of the hollow carrier, and said tubular hub also having ports communicating with the bottoms of the radial slag-receptacles, said steam-pipe having an outlet-port in its bottom to communicate successively with the ducts in the tubular hub.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GEORGE MITCHELL.

Witnesses:

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