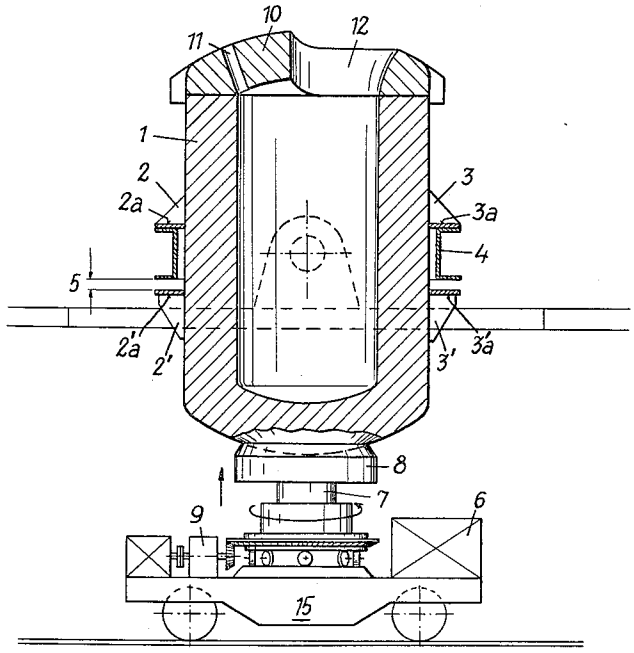
Oct. 24, 1961 R. RINESCH 3,005,628

REFRACTORY LINED REFINING VESSELS

Filed May 21, 1959



INVENTOR.
RUDOLF RINESCH

BY
Brumbaugh, Free, Graves & Donohue

HIS ATTORNEYS

United States Patent Office 3,005,628
Patented Oct. 24, 1961

3,005,628

REFRACTORY LINED REFINING VESSELS

Rudolf Rinesch, Froschberg, Linz (Danube), Austria, assignor to Vereinigte Österreichische Eisen- und Stahlwerke Aktiengesellschaft, Linz (Danube), Austria, a company of Austria

Filed May 21, 1959, Ser. No. 814,807
Claims priority, application Austria May 30, 1958
2 Claims. (Cl. 266—36)

This invention relates to refining vessels adapted for use in top blowing processes in which oxygen or an oxygen-enriched refining gas is blown onto the surface of molten crude iron for the production of steel.

Known refining processes of the kind mentioned above use a crucible or converter of cylindrical or pear-like shape, in which the bottom part may be integral with or removable from the shell part of the vessel. The vessel is provided with a refractory lining, which may consist of several layers and which must be renewed after a period of continuous operation amounting to about 200 to 300 heats. It is desired to perform as many individual heats as possible during such a period between relining (campaign of the converter), because each relining requires a relatively long time (about 2 days).

To mount a refining vessel provided with a refractory lining, known equipment comprises a carrying ring, which surrounds the shell approximately on the level of the centre of gravity and which is rigidly connected to two trunnions. The vessel is tiltable by means of electrical drive means connected to the trunnions from an approximately vertical blowing position to an inverted position, in which the vessel is emptied. The trunnion ring has the function of holding the vessel in all positions and of transmitting to the vessel the forces exercised by the tilting drive.

For holding the vessel, a number of pairs of claws are used, which are distributed around the periphery of the crucible and between which the trunnion ring is disposed. The several claws consist of short beams in the form of steel angles. One flange of each claw is rigidly connected, e.g. by riveting, to the crucible wall and the other flange protruding from the outside wall of the crucible engages the trunnion ring. It was common to the previous arrangements for holding the vessel that one protruding flange of each pair of claws engaged the trunnion ring at the top and the other protruding flange engaged the carrying ring at the bottom, in both cases without a clearance, so that the vessel was firmly gripped in the carrying ring.

It has been found that in the case of a successive performance of a relatively large number of individual heats, as is the case during a campaign of the converter, using the refining vessels described hereinbefore, the refractory lining was attacked to an irregular extent. Owing to the fact that the vessel was non-rotatably and firmly gripped by the trunnion ring, the two sides of the vessel which extend at right angles to the tilting plane in the plane of the trunnions were consumed much more rapidly than the other parts of the lining.

It is an object of the invention to avoid this difficulty. The invention resides in the provision of a structure enabling the vessel to be rotated from time to time about its longitudinal axis during a campaign of the converter to equalize the wear of the lining. This rotation of the vessel is effected as soon as a correspondingly high wear of the refractory lining on the sides is observed after a certain number of heats. The first rotation is preferably effected through an angle of about 90°. The subsequent rotations are effected in dependence on the places of wear in such a manner that the angle of rotation after one or several heats is so determined that the zones previously

subjected to wear will be subjected to the least wear during the subsequent heats. In this way an irregular wear of the refractory lining can be prevented and the number of individual heats during a converter campaign can be substantially increased. This results in an improved utilization of the capacity of the plant and in a reduction of production costs.

The rotatability of a converter relative to its support is known per se. Rotary converters have been proposed to provide for an improved accessibility of the sides of the converter during repairs. With this construction, however, it is not possible to blow a new heat in a rotated position but the converter had to be turned back to its original position after repairs. For this reason the wear of the lining remained irregular and the number of individual heats during a campaign of the converter remained unsatisfactorily low.

In accordance with the invention, the crucible is mounted so that it is freely rotatable relative to its carrying ring. This is achieved by providing a clearance between the carrying ring and the lower flanges of the claws when the crucible is in its vertical position. The crucible is held by the trunnion ring which engages the protruding flanges of the upper claws in the vertical position or during tilting between the vertical and horizontal positions. In order to avoid slippage of the crucible during tilting, the clearance is eliminated by locking means during operation. Below the crucible a lifting and rotating device, which is electrically or preferably hydraulically driven, may be provided in the vertical position. After a period of time which depends on the wear of the lining the crucible can be lifted and rotated through a certain angle owing to the clearance between the trunnion ring and the lower flanges after the locking means have been released. This ensures a uniform consumption of the refractory lining and a prolonged durability.

In a preferred embodiment of the invention the cylindrical shell part of the crucible has mounted thereon a cover, which is rotatable relative to the shell part. The cover has an opening for the introduction and pulling of the blowing tube and may be provided with a tapping hole. Owing to the fact that the cover is movable relative to the crucible after the rotation thereof according to the invention, the cover will remain in the same position relative to the parts of the blowing means which are affixed to the upper part of the blowing stand.

The invention will be explained more fully hereinafter with reference to the diagrammatical longitudinal sectional view shown in the accompanying drawing.

The cylindrical crucible **1** having a refractory lining is provided with a number of pairs of claws which are arranged around the periphery of its shell. Each pair of claws consists of an upper claw **2**, **3** and a lower claw **2'**, **3'**. The claws are short beams in the form of steel angles having flanges **2***a*, **3***a* and **2'***a*, **3'***a*, respectively, which protrude from the crucible wall. The shell of the crucible is surrounded by the carrying ring **4**, which may be a channel section. In the vertical blowing position the flanges **2***a* and **3***a* rest on the top of the carrying ring and hold the crucible. A clearance **5** is provided between the lower flanges **2'***a*, **3'***a* and the trunnion ring **4**. Below the curved bottom part of the crucible a wheeled carriage **15** carries a device which consists in the illustrative embodiment of a hydraulic pump **6** with a liquid container, the lifting piston **7**, the carrying plate **8** and the rotating device **9** acting on the lifting piston. When the crucible is to be rotated relative to the trunnion ring after a predetermined period of time, e.g., after one or several heats, the crucible is lifted by means of the lifting piston **7** and the carrying plate **8** and is rotated to its new position with the aid of the rotating device **9**. Then the lifting piston

7 is lowered until the flanges 2*a*, 3*a* rest again on the trunnion ring.

As is apparent from the drawing the cover 10 is mounted on the cylindrical shell part of the crucible and has an opening 12 for the introduction of a blowing tube and of additions as well as a tapping hole 11. According to the invention the cover 10 can be detached from the crucible so that the crucible 1 can be rotated without causing a change in the position of the cover relative to the stationary blowing means, feed chutes and the like (not shown) which are affixed to the upper part of the blowing stand.

What I claim is:

1. A refining vessel comprising a shell having a closed end and an opposite open end, a refractory lining in said shell, a ring rotatable relative to said shell and encircling it at about the mid-portion of said shell, trunnions connected to said ring and supporting it for tilting movement around an axis transverse to the longitudinal axis of said shell, a first group of angularly spaced beams fixed to and projecting from said shell above said ring to support said shell thereon when the open end is directed upwardly, a second group of angularly spaced beams projecting from said shell below and in spaced relation to said ring, means engageable with the shell when its longitudinal axis is directed vertically to lift it and disengage said first group of beams from said ring and means for rotating said lifting means to rotate said shell relative to said ring.

2. The refining vessel set forth in claim 1 comprising a cover for said open end of said shell engaging and rotatable relative to said shell and having an opening therein.

References Cited in the file of this patent

UNITED STATES PATENTS

225,932	Jones	Mar. 30, 1880
2,598,393	Kalling et al.	May 27, 1952
2,902,358	Kalling et al.	Sept. 1, 1959