Page, White, Fasser.

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Tiltable Crucibles or Converters

We, VEREINIGTE ÖSTERREICHISCHE EISEN- UND STAHLWERKE AKTIENGESELLSCHAFT, a Company organized under the laws of Austria, of 5, Muldenstrasse, Linz, Austria, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

Tiltable crucibles or converters for refining crude iron consist of a cylindrical or pear-shaped vessel or shell provided with a refractory lining. A trunnion ring extends around the crucible shell approximately on the level of the center of gravity and is rigidly connected to two trunnions. It must be possible to tilt the crucible shell from an approximately vertical blowing position into an inverted position until it has been emptied and to erect it by means of electromechanical or hydraulic drives acting on the trunnions. For this purpose the crucible shell is mounted in the trunnion ring by means of a plurality of brackets, so-called claws which are spaced around the periphery of the shell of the crucible and are suitably provided in pairs, those flanges of the claws which protrude from the shell wall engaging the top and bottom of the trunnion ring.

In relatively small, riveted refining vessels or shells the claws consisting in most cases of cast steel shapes are riveted to the wall of the vessel. In welded larger crucible shells as are used for top blowing processes, the claws have been connected to the shell wall with the aid of fitting screws so that they can take up all forces occurring, tensile as well as transverse forces.

It has been found that in the case of very heavy crucibles, from approximately 30 tons upwards, the fitting screws break, partly in their threaded portion and partly in their unthreaded portion extending through bores in the shell, as a result of thermal expansion. It is impossible or at least very difficult to replace these broken screws by new fitting screws because owing to the damage to the bore wall a complete take up of the transverse forces cannot be ensured.

It is the main object of the invention to provide a crucible with a trunnion mounting which avoids these disadvantages.

According to the invention a crucible for refining crude iron, comprises a crucible shell, a trunnion ring extending around the crucible shell engaging between a number of pairs of carrying claws spaced around the periphery of the shell to support the same, and connections between the carrying claws and the crucible shell comprising connecting members which take up tensile forces, such as screws, and connecting members which take up only transverse forces, such as stops. By dividing the absorption of the forces, the invention affords a higher safety than in the hitherto known construction. The screws may be much smaller than the former fitting screws without danger of breakage.

In the case of the claws which take up the full load of the filled crucible in the vertical blowing position e.g. the upper claws of the pairs, the connecting members taking up the transverse forces comprise stops welded into the wall of the crucible shell, e.g., of round pins or dowels, fitted in bores of that flange of the claw which adjoins the shell wall. Because one such pin would not be sufficient to prevent a rotation of the claw in the tilted position of the crucible, at least two pins for each carrying claw are provided.

In the case of claws which are subjected to smaller stresses, e.g., the lower claws of the pairs, which are required only to hold the empty crucible shell in inverted position, the stop need not be welded into the crucible shell wall and fitted into a bore of the adjoining claw flange; it is sufficient to take up the transverse forces occurring by stops

which are welded on the crucible wall and support the claws.

The connecting members which take up the tensile forces may consist of simple tension screws. In order to prevent the introduction of other than strictly tensile forces into the shank of the screw, even when the shell is tipped over, which forces may be due to thermal expansion or to a permanent deformation of the crucible shell, the tension screws are mounted on suitable washers.

In order that the invention may be more clearly understood some embodiments in accordance therewith will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a side view showing the crucible;

Fig. 2 is a front view showing an upper claw;

Fig. 3 is a front view showing a lower claw; and

Figs. 4 and 5, respectively, are sectional views taken through the claw flanges and the crucible shell wall shown in Figs. 2 and 3.

The crucible shell 1 is surrounded by the trunnion ring 2, which is mounted between pairs of claws, i.e. the upper claws 3 and the lower claws 4. Each claw comprises the flanges 3*a* and 4*a*, respectively, contiguous to the crucible shell wall, and the projecting flanges 3*b* and 4*b*, respectively, which engage the top or bottom of the trunnion ring. As is apparent from Figs. 2 and 4, those flanges 3*a* of the upper claws 3 which adjoin the crucible shell wall 1 are connected to the crucible by two pins 5 which are welded into the crucible shell wall and fit bores of this flange and by screws 6. The stop pins 5 take up pure transverse or shearing forces and the screws 6 take up pure tensile forces. The screws 6 may pass through washers which ensure that the screws only absorb tensile forces.

The flanges 4*a* of the lower claws 4 which adjoin the crucible shell wall are held and supported by a stop rib 7 which is welded on the wall 1 and extends around the flange 4*a*. These stops take up only the transverse forces. Instead of providing a welded-on rib 7 extending continuously around the flange 4*a*, short sections may be provided at two or more points of the edge of the flange for the same purpose. The tensile forces are taken up by the screws 6 as in the case of the upper claws.

WHAT WE CLAIM IS:

1. A tiltable crucible for refining crude iron, comprising a crucible shell, a trunnion ring extending around the crucible shell engaging between a number of pairs of carrying claws spaced around the periphery of the shell to support the same, and connections between the carrying claws and the crucible shell comprising connecting members which take up tensile forces, such as screws, and connecting members which take up only transverse forces, such as stops.

2. A crucible according to claim 1, wherein the connecting members for a claw which take up the transverse forces comprise stops welded into the wall of the crucible shell, preferably formed by at least two pins, fitted in bores in that flange of the claw which adjoins the shell wall.

3. A crucible according to claim 1 or 2 wherein the connecting members for a claw which take up the transverse forces comprise stops welded on the shell wall and support at least at two points that flange of the claw which adjoins the shell wall.

4. A crucible according to any of claims 1 to 3 wherein the connecting membets of a claw which take up the tensile forces are tension screws mounted on washers so that only pure tensile forces are taken up by the shanks of the screws.

5. Tiltable crucible or converter substantially as herein described with reference to the accompanying drawings.

Dated this 14th day of September, 1959.

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which are welded on the crucible wall and support the claws.

The connecting members which take up the tensile forces may consist of simple tension screws. In order to prevent the introduction of other than strictly tensile forces into the shank of the screw, even when the shell is tipped over, which forces may be due to thermal expansion or to a permanent deformation of the crucible shell, the tension screws are mounted on suitable washers.

In order that the invention may be more clearly understood some embodiments in accordance therewith will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a side view showing the crucible;

Fig. 2 is a front view showing an upper claw;

Fig. 3 is a front view showing a lower claw; and

Figs. 4 and 5, respectively, are sectional views taken through the claw flanges and the crucible shell wall shown in Figs. 2 and 3.

The crucible shell 1 is surrounded by the trunnion ring 2, which is mounted between pairs of claws, i.e. the upper claws 3 and the lower claws 4. Each claw comprises the flanges 3*a* and 4*a*, respectively, contiguous to the crucible shell wall, and the projecting flanges 3*b* and 4*b*, respectively, which engage the top or bottom of the trunnion ring. As is apparent from Figs. 2 and 4, those flanges 3*a* of the upper claws 3 which adjoin the crucible shell wall 1 are connected to the crucible by two pins 5 which are welded into the crucible shell wall and fit bores of this flange and by screws 6. The stop pins 5 take up pure transverse or shearing forces and the screws 6 take up pure tensile forces. The screws 6 may pass through washers which ensure that the screws only absorb tensile forces.

The flanges 4*a* of the lower claws 4 which adjoin the crucible shell wall are held and supported by a stop rib 7 which is welded on the wall 1 and extends around the flange 4*a*. These stops take up only the transverse forces. Instead of providing a welded-on rib 7 extending continuously around the flange 4*a*, short sections may be provided at two or more points of the edge of the flange for the same purpose. The tensile forces are taken up by the screws 6 as in the case of the upper claws.

WHAT WE CLAIM IS:

1. A tiltable crucible for refining crude iron, comprising a crucible shell, a trunnion ring extending around the crucible shell engaging between a number of pairs of carrying claws spaced around the periphery of the shell to support the same, and connections between the carrying claws and the crucible shell comprising connecting members which take up tensile forces, such as screws, and connecting members which take up only transverse forces, such as stops.

2. A crucible according to claim 1, wherein the connecting members for a claw which take up the transverse forces comprise stops welded into the wall of the crucible shell, preferably formed by at least two pins, fitted in bores in that flange of the claw which adjoins the shell wall.

3. A crucible according to claim 1 or 2 wherein the connecting members for a claw which take up the transverse forces comprise stops welded on the shell wall and support at least at two points that flange of the claw which adjoins the shell wall.

4. A crucible according to any of claims 1 to 3 wherein the connecting members of a claw which take up the tensile forces are tension screws mounted on washers so that only pure tensile forces are taken up by the shanks of the screws.

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