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[11] **3,792,850**

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[54] **DEVICE FOR MELT TAPPING FROM METALLURGICAL UNIT**

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Related U.S. Application Data

[63] Continuation of Ser. No. 163,753, July 19, 1971, abandoned.

[52] **U.S. Cl.** **266/38,** 164/337

[51] **Int. Cl.** **C21b 7/14**

[58] **Field of Search** 164/136, 335, 337; 222/168; 266/25, 38, 42

[56] **References Cited**

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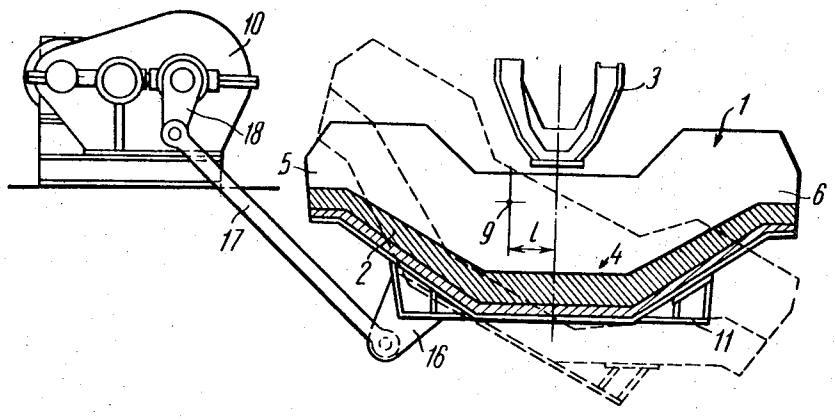
[57] **ABSTRACT**

A device for tapping the melt from a spout of a metallurgical unit into ladles through an open channel runner which can be tilted about a pivot axis; the runner pivot axis is shifted in relation to its lateral axis of symmetry and an axis of the spout in the direction of a pouring lip of the runner by a distance providing for sufficiently easy tilting of the runner during drainage. The runner is placed immediately below the metallurgical unit spout. The device has a drive to tilt the runner about the pivot axis and the runner may be housed in a cradle made in the form of a frame with trunnions arranged on said pivot axis of the runner and coupled to the said drive.

3 Claims, 3 Drawing Figures



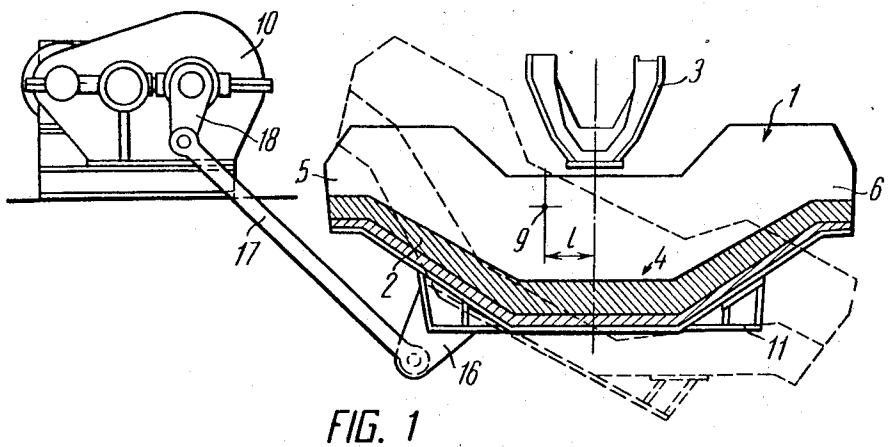


FIG. 1

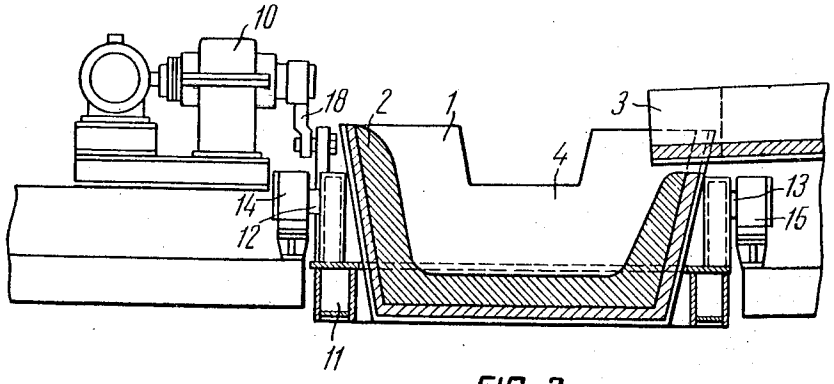


FIG. 3

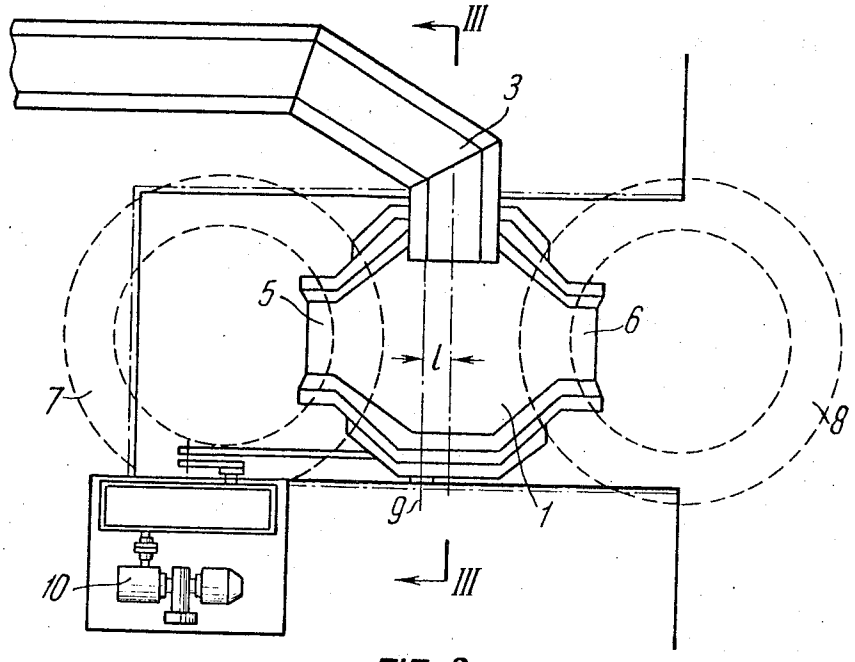


FIG. 2

DEVICE FOR MELT TAPPING FROM METALLURGICAL UNIT

This is a continuation, of application Ser. No. 163,753 , filed July 19, 1971, and now abandoned.

FIELD OF THE INVENTION

The present invention relates to devices for tapping the melt from a metallurgical unit and are in particular intended, intended for tapping liquid iron or cinder from a blast furnace into ladles.

The use of devices, whose purpose is to reduce the length of spouts, in the above said applications is commonly known.

Owing to simplicity of construction and minimum length, swing runners have the most expensive application.

DESCRIPTION OF PRIOR ART

Known in prior art is a device for tapping the melt from a metallurgical unit, incorporating a refractory-lined runner fitted with a recess in its bottom portion in the zone of fall of the melt stream and with two pouring lips at the opposite ends of the runner, and a drive designed for swinging the runner about horizontal axis.

However in service they are liable to be rapidly worn on account of washouts (erosion) of the bottom lining under the effect of heavy impact of the melt stream. In addition, the melt is prone to splashing which results from the impact of the melt stream against the lining in the bottom portion of the runner.

It has been proposed to fabricate a "runner" by cutting out its side walls and reducing the spacing between the runner and the trough of a metallurgical unit, so as to reduce the splashing which would otherwise occur, but such an arrangement has proved rather undesirable. as it has not enabled the runner to be tilted additionally for draining it completely. If despite the runner is tilted additionally to discharge the last portion of the melt from the recess in its bottom, it rests against the trough of the metallurgical unit. With the runner in the lower position the height of fall of the melt stream tends to increase with the ensuring intense splashing and a more rapid wear on the runner lining.

Attempts have been made to increase the recess in the zone of fall of the melt stream, forming thereby a layer of metal to damp the above stream. But it necessitates a runner of larger dimensions. The latter in its turn may lead to a situation when the runner occupies the clearance gage of the rolling stock which is used to carry the ladles into which molten metal is discharged, and this is unacceptable.

An additional tilt of the runner is impractical in that which such a tilt the runner rests against the edge of a ladle.

It is an object of the present invention to eliminate the above said drawbacks.

The invention in essence aims at developing a device for tapping the melt from a metallurgical unit which device would have a longer life through a reduction in the height of fall of the melt stream ensuring in the mean time the possibility of tilting the runner for better drainage with the runner placed more closely to the pouring lip of a stationary spout.

This object is achieved by designing a device for tapping the melt from a metallurgical unit, the device comprising a runner, lined with a refractory material and

fitted with a recess in its bottom portion in the zone of fall of the melt stream and with pouring lips at the opposite ends of the runner, and a drive, means intended for swinging the runner about a horizontal axis. In the device according to the invention, the said runner pivot axis is shifted in relation to its lateral axis of symmetry in the direction of the pouring lip by a distance ensuring sufficiently easy tilting of the runner during drainage with the runner arranged in the immediate viscinity of the trough of a metallurgical unit.

The above arrangement provides the device a prolonged life owing to a reduction in the height of fall of the melt stream and a comparatively small size along with adequate maneuverability — a must for complete drainage.

It is expedient to house this device in a cradle in the form of a frame with trunnions, disposed on the runner pivot axis and coupled to the said drive means. The above arrangement with a detachable runner will alow an easier and more rapid replacement of the runners.

To make the invention more clear, given below is an exemplary embodiment to be considered with due reference to the accompanying drawings, wherein:

FIG. 1 is a diagrammatic illustration of a device with the runner shown in section as cut along its longitudinal axis by a vertical plane.

FIG. 2 diagrammatically illustrates a scaled-down plan view of the invention with runners shown by a dotted line.

FIG. 3 — section III—III through FIG. 2.

A device for tapping the melt (molten iron or cinder) from a metallurgical unit, e.g., a blast furnace, comprises runner **1** (FIGS. **1, 2** and **3**), lined with refractory material **2**. Runner **1** in the zone of fall of the melt stream from trough **3** of the metallurgical unit has recess **4** in its bottom portion and pouring lips **5** and **6** (FIG. 2) at its opposite ends. Placed under pouring lip **5** is ladle **7** and under lip **6** - ladle **8.**

Runner **1** is turned about a horizontal axis by means of drive **10.**

Pivot axis **9** of runner **1** is shifted relative to its lateral axis of symmetry in the direction of lip **5** at a distance "l" ensuring sufficiently easy tilting of the runner during drainage with runner **1** disposed in the immediate viscinity of trough **3** of the metallurgical unit (not shown in the drawing).

For ease of replacement the runner is placed in cradle **11,** made in the form of a frame with trunnions **12** and **13** (FIG. **3**) located on the said pivot axis and resting on stationary mounted bearings **14** and **15.** Cradle **11** is coupled to drive **10** with the aid of ear **16** (FIG. **1**), connecting rod **17** and crank **18.**

The device, conforming to this invention, functions as follows.

From the very first moment when the first melt is tapped from a blast furnace in a thin stream, recess **4** (FIG. **1**) in runner **1** is first to be filled up with the melt acting subsequently as a protective layer. Next with the aid of drive **10,** crank **18** and connecting rod **17,** cradle **11** together with runner **1** is swung through a 5° to 10° angle in the direction of ladle **7** (FIG. **2**) being filled. The melt falls from through **3** of the metallurgical unit onto the melt protective layer in recess **4,** its energy is absorbed and it flows uniformly over lip **5** into ladle **7.**

As soon as ladle **7** is filled up, drive **10** is made to swing the cradle **11** together with runner **1** through the

same angle in the direction of ladle **8**, which is standing on the second parallel line of rails. While ladle **8** is being filled, ladle **7** is replaced by a new empty ladle with all the operations associated with the melt tapping repeated in the same sequence.

Tapping completed, drive **10** swings cradle **11** with runner **1** above the ladle through a 45° to 50° angle to empty runner **1** completely (in FIG. **1** the above position is shown by a dotted line). Following that runner **1** is inspected for lining condition and, if seriously damaged, removed with the aid of the ears from cradle **11** to be replaced with a new one.

As shown by the tests, the lining durability has increased by 10 to 12 times amounting to 250—300 casts from the blast furnace. As for the splashing of the melt, it is practically eliminated.

What is claimed is:

1. A device for tapping molten material from a spout of a metallurgical unit into ladles, comprising: an elongated channel-like runner lined with refractory material and formed with a pouring lip at each end thereof, the runner having a recess in its bottom portion in the zone of fall of the molten material from the spout;

means mounting the runner below said spout with a length of the runner disposed substantially at right angles to the direction in which said spout projects and the molten material discharges, said means including bearings arranged transverse to said length and disposed along a pivot axis of the runner, the pivot axis being offset from its lateral axis of symmetry in the direction of said spout; and a drive to tilt the runner about the axis of the trunnions, whereby the runner in its tilted position is physically close to the spout so as to obviate erosion of the runner lining of the refractory material by effectively reducing the distance between the spout and the runner in its tilted position.

2. The device of claim **1**, in which said means mounting the runner includes a cradle made in the form of a frame with trunnions in said bearings arranged on the said pivot axis of the runner and articulated with said drive.

3. The device of claim **2**, in which said means mounting the runner includes an ear member secured to said cradle, and wherein said drive includes a crank and a connecting rod.

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