

[54] **ARRANGEMENT AT WALKING BEAM FURNACE**

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[58] Field of Search**263/6 A, 6 R**

[56] **References Cited**

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[57] **ABSTRACT**

A walking beam furnace for heating a charge being advanced through the furnace by walking beams located in longitudinal opening in the hearth which is provided with longitudinally extending ridges on both sides of the openings for supporting the charge thereby forming a longitudinally extending area above the walking beams operating in the area. The ridges are provided with transverse channels connecting the longitudinal areas for the walking beams with the spaces outside the ridges, and these spaces are supplied with heat for introduction into the areas above the walking beams but below the charge.

6 Claims, 4 Drawing Figures

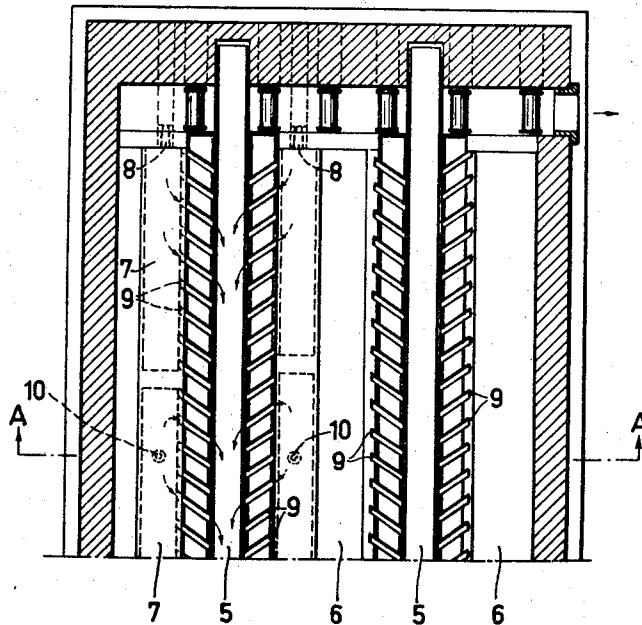


FIG.1

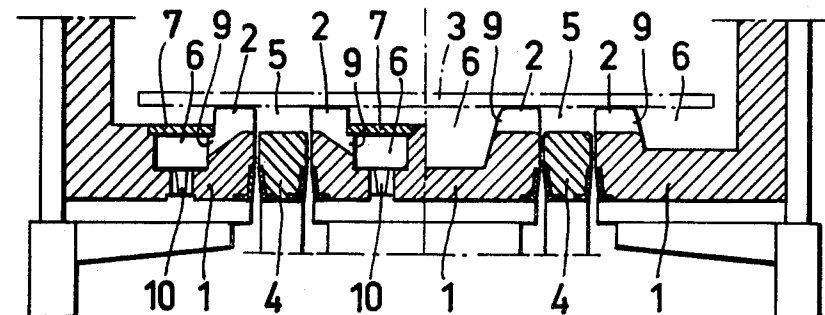


FIG.2

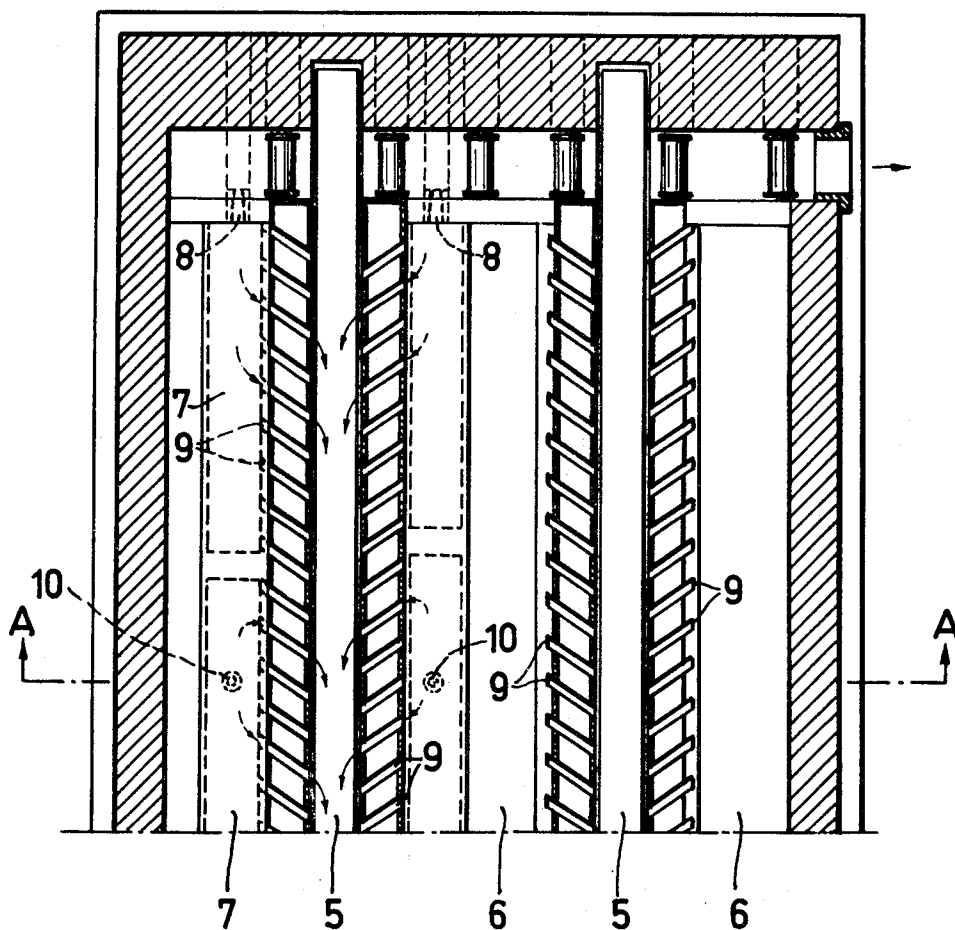


FIG.3

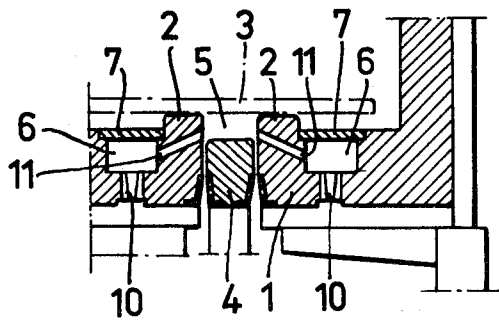
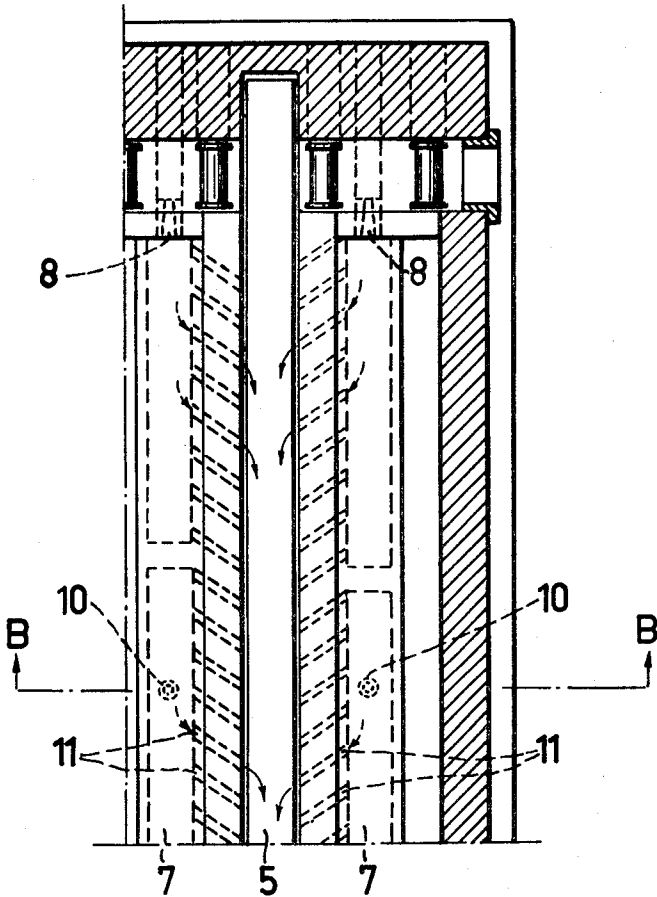


FIG.4



ARRANGEMENT AT WALKING BEAM FURNACE

This invention relates to a walking beam furnace for heating the charge being advanced through the furnace by walking beams located in longitudinal openings in the hearth. The hearth is provided with longitudinal supporting ridges for the charge on both sides of the openings, thereby forming a longitudinal area above the walking beams operating in said area. The invention has as its object to improve the temperature uniformity for the material being heated in the furnace and to compensate for the heat losses occurring through the furnace bottom and especially at the gaps at the longitudinal areas for the walking beams. It has been a problem since a long time ago, that the charge advanced through the furnace shows cooling rings on the surfaces, which during the transport through the furnace had faced the walking beams. The present invention eliminates to a very large extent the formation of these cooling rings, because the invention provides a possibility of supplying heat to the areas above the walking beams which otherwise do not receive any heat from heating the charge. The heat can be controlled with respect to its amount, transport speed and direction, and a uniform heating of the lower surfaces of the charge is obtained. The heat supplied can according to the invention be produced in different ways, for example by the arrangement of auxiliary burners in suitable places. The burners can be controlled in a suitable way, for example by the supply of excess air so that the burner or the flames of the burners are tempered as desired. The invention, furthermore, renders it possible to make use of the recirculation of waste gases or excess gas in the furnace, and the heat content of these gases is utilized for an additional heat supply to the lower surface of the charge.

For achieving the aforesaid advantages and eliminating the serious shortcomings of the conventional systems, the arrangement according to the invention has been given the characterizing feature that the supporting ridges are provided with transverse channels connecting the longitudinal areas for the walking beams with the spaces outside the ridges, which spaces are supplied with heat for introduction into the areas above the walking beams but below the charge.

Three alternative embodiments of the invention are described in the following, with reference to the accompanying small

FIG. 1 shows cross-section cross-section through a walking beam furnace, the left-hand portion of the Figure showing one, and the right-hand portion showing a second embodiment.

FIG. 2 shows a part of a walking beam furnace in a plane section, disclosing the section according to FIG. 1 having been taken along the lines A—A.

FIG. 3 shows half a cross-section of a walking beam furnace constructed according to a third embodiment, and

FIG. 4 shows a plane view of the walking beam furnace according to the lastmentioned embodiment, disclosing the section according to FIG. 3 having been taken along the line B—B in FIG. 4.

The walking beam furnace comprises a stationary hearth 1, which is provided with four supporting ridges 2, on which the charge rests when the walking beams are in their non-operative lowered positions. The walk-

ing beams 4 operate in a usual way upwards and reciprocate in longitudinal grooves 5 taken out in the hearth and located between two supporting ridges 2. At a hearth of conventional construction, the heat losses occur downwards toward the walking beams and within the gaps formed between the walking beams and the hearth. Therefore, the heat conditions above the walking beams and toward the lower surface of the charge differ from those in other areas above the hearth in the furnace. The charge 3, therefore, develops so-called cooling rings on its lower surfaces in those areas facing downwardly towards the walking beams 4. These cooling rings, as mentioned above, are to be eliminated by heat balance or compensation of the heat losses above and at the walking beams. According to the left-hand portion of FIG. 1, therefore, closed furrows 6 are arranged on the outside of the supporting ridges 2. The furrows are covered on the upper side by longitudinal covers 7, and heat is supplied to the furrows 6, for example, from burners 8, FIG. 2, provided at the end wall of the furnace, i.e. at the feed end. In FIG. 2 the charge is fed from above in the Figure and transported through the furnace, which only in its longitudinal extension partially is shown in FIG. 2. The heat hereby supplied to the furrows 6 is introduced to the area above the walking beams through channels provided in the supporting ridges 2. The channels are designated by 9 and, as appears from FIG. 2, extend obliquely inwardly toward the walking beams and in the direction of transport of the charge through the furnace. The arrows in the left-hand portion of FIG. 2 illustrate the way of the heat from the furrows 6 through the channels 9 into the area 5 above the walking beams. The channels 9 are so arranged with respect to their cross-sectional opening and division that the desired heat distribution is effected along the entire area 5 above the walking beams. The heat distribution is promoted by the obliqueness of the channels 9 which, however, also is suitable and perhaps necessary in the case of a charge having a small width, which charge otherwise upon lowering of the walking beams may fall down through the channels 9 in the supporting ridges. Auxiliary burners, in addition to those in the end walls, may be provided where required, for example in the places 10 marked in FIG. 2 and in the left-hand portion of FIG. 1.

The right-hand portion of FIGS. 1 and 2 show a second embodiment at which for corresponding details the same reference numerals as in the left-hand portions of the Figures have been used. The difference compared with the first embodiment is that the furrows 6 on the outside of the supporting ridges 2 are open upwardly, but in other respects have the same form of channel connection to the area 5 above the walking beam 4. Heat is supplied to the furrows 6 by recirculation of waste gases from the furnace or of gases being within the furnace. By a suitable pressure relation the hot gases can be self-circulated to the furrows 6 and through the channels 9 be introduced into the area 5.

In FIGS. 3 and 4 a third embodiment is shown by way of only the right-hand portion or right-hand half of a walking beam furnace. This embodiment corresponds in all essential parts to the design shown in the left-hand portion of FIGS. 1 and 2, i.e. the first embodiment, and also the reference numerals are the same. The difference is that the channels, which connect the furrows

6 with the area 5 in the third embodiment, are tubular channels 11 extending through the supporting ridges 2. Said tubular channels extend obliquely upwards from the furrows 6 and also obliquely forward in the direction of motion of the charge. The furrows are covered by covers 7, and heat is supplied to the furrows by extra burners 8 and 10. The arrows in FIG. 4 mark the way of the heat transport into the area 5.

The scope of the invention allows for more embodiments than those described. The channels, for example, may be designed in different ways and also be directed perpendicularly to the walking beams or obliquely rearwards, depending on how the heat is supplied to the furrows and on the prevailing pressure conditions. The advantage of using tubular channels 11 through the supporting ridges is that a charge of small width safely can be supported by the supporting ridges. Heat may also be supplied to the furrows 6 in a way different from that now described and, for example, ramps of burners may be provided in the furrows 6.

What I claim is:

1. In a walking beam furnace for heating a charge whilst being advanced in feeding direction through the furnace by a walking beam disposed in a longitudinal opening in a stationary hearth of the furnace which hearth is provided with longitudinal supporting ridges for the charge in both sides of said opening thereby forming a longitudinal area above said walking beam, the improved construction which further comprises

heating ducts longitudinally disposed outside of and parallel to said supporting ridges; a heating means operatively associated with each of said heating ducts and adapted to supply heating gas thereto; and a series of transverse channels connecting said heating ducts with said longitudinal area for supplying heat into said area above said walking beam but below such charge.

2. A walking beam furnace according to claim 1, characterized in that said channels are open upwardly through the ridges and directed obliquely to the feeding direction.

3. A walking beam furnace according to claim 1, characterized in that the channels have tubular shape.

4. A walking beam furnace according to claim 1, characterized in that the heating ducts outside the ridges are covered furrows at the outsides of the supporting ridges, and that the channels extend from these furrows inwardly towards the areas for the walking beams, and that heat is supplied to the furrows by burners.

5. A walking beam furnace according to claim 1, characterized in that the heating ducts outside the ridges are open furrows, and that heat is supplied by recirculation of excess gases in or from the furnace.

6. A walking beam furnace according to claim 4, characterized in that the covered furrows are provided with ramps of burners.

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