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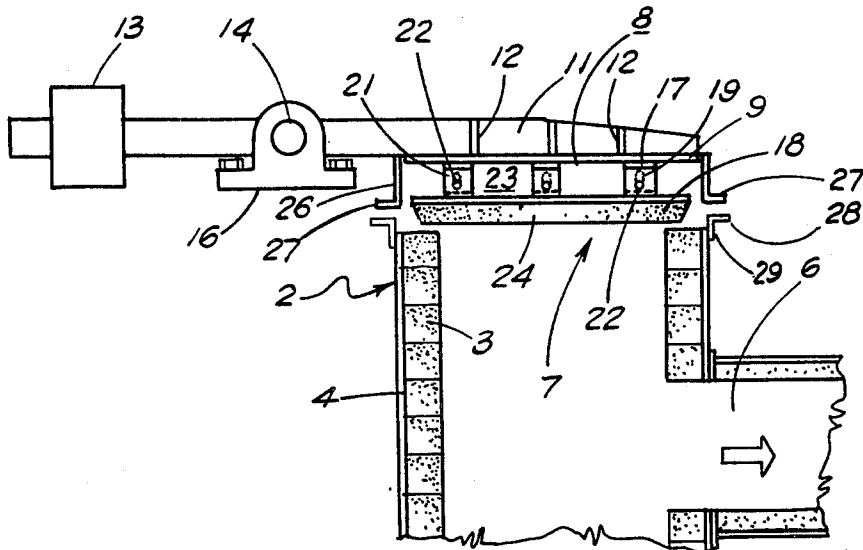
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[54] **CUPOLA EXHAUST APPARATUS**  
 3 Claims, 5 Drawing Figs.

[52] U.S. Cl. .... 266/31,  
 110/173  
 [51] Int. Cl. .... C21b 7/08  
 [50] Field of Search ..... 266/24, 26,  
 31, 34, 38, 39; 110/173 (A), (Inquired)

**ABSTRACT:** An exhaust arrangement for a metallurgical cupola including a cap for a cupola stack outlet, the cap having a plenum chamber disposed therein exhausted to a system below atmosphere pressure, the plenum chamber being in communication with the peripheral seal between the cap and stack outlet to facilitate removal of any stack gas leakage, the cap being floatingly mounted to permit more effective sealing with the stack outlet.



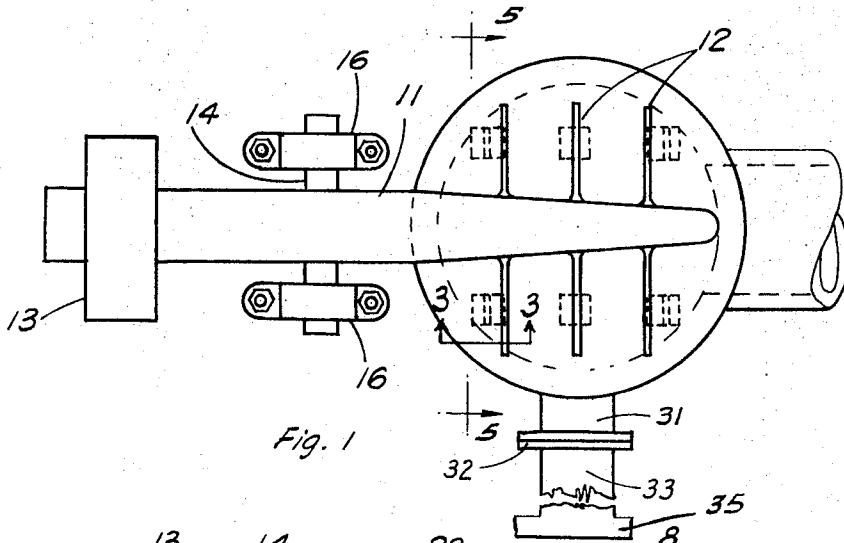


Fig. 1

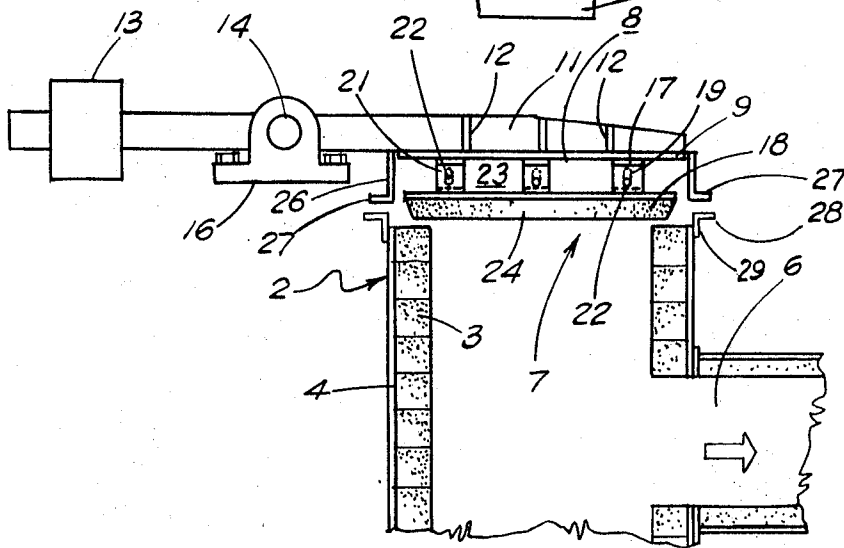


Fig. 2

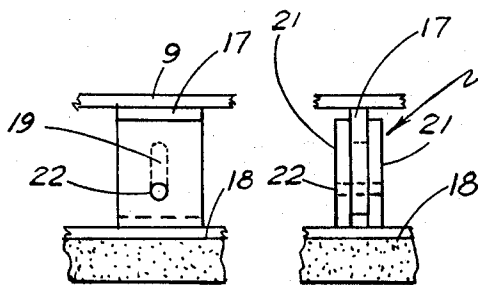


Fig. 3

Fig. 4

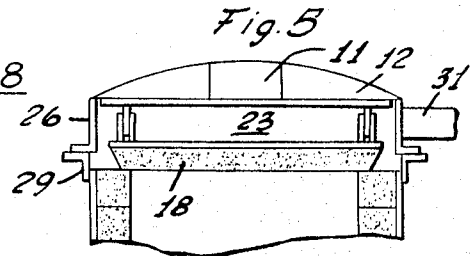


Fig. 5

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## CUPOLA EXHAUST APPARATUS

## BACKGROUND OF THE INVENTION

The present invention pertains to an improved metallurgical furnace offtake, and more particularly, to a new, useful and unobvious cap arrangement for a cupola stack outlet.

Various types of arrangements are provided for offtakes of metallurgical cupolas to ensure that during normal operations the exhaust stack is closed to ambient atmosphere so that dirty gases emitted from the cupola are passed from the cupola stack through a main gas offtake to suitable gas scrubbing devices. For the most part, these past arrangements have proven to be complex and expensive in construction and maintenance, and have presented problems in leakage in the areas where the cap engages the cupola stack outlet.

## SUMMARY OF THE INVENTION

The present invention, recognizing that these past cupola cap arrangements have been difficult in construction and maintenance and have presented leakage problems, provides a unique vented cupola cap which is straightforward and economical in both construction and operation, allowing quick installation and removal with minimum leakage when the cap is in its closed position, assuring that any exhaust gas leakage which might occur is carried off rapidly to a preselected destination. At the same time, the present invention provides an arrangement which permits utilization of a comparatively light cap for sealing purposes, the cap being floatingly mounted to insure more effective sealing, and being so constructed with an internally disposed plenum chamber to permit cooling of the cap during normal operations.

Various other features of the present invention will become obvious to one skilled in the art upon reading the disclosure set forth herein.

More particularly, the present invention provides an exhaust arrangement for a metallurgical cupola comprising: cupola stack means having a main gas offtake and an ambient atmosphere stack outlet; removable cap means for the stack outlet, the peripheral edge of the cap means engaging with the peripheral edge of the stack means providing a peripheral seal to close the stack means from ambient atmosphere during normal cupola melting operations, the cap means having a plenum chamber disposed therein in communication with the peripheral seal between the cap means edge and the stack outlet edge; and duct offtake means in communication with the plenum chamber, the duct offtake means being connected to a pressure source below atmospheric to facilitate removal of any stack gas leakage. In addition, the present invention provides a cap means including a seal wall floatingly suspended in spaced relation from a lift wall to define the plenum chamber therebetween, the seal wall engaging in peripherally sealed relation with the peripheral edge of the stack means outlet.

It is to be understood that various changes can be made in the several parts of the structure disclosed herein without departing from the scope or spirit of the present invention.

Referring to the drawing which discloses one advantageous embodiment of the present invention:

FIG. 1 is a plan view of the novel cupola cap arrangement;

FIG. 2 is a cross-sectional side elevation view of the apparatus of FIG. 1 and a portion of the cupola stack;

FIG. 3 is an enlarged elevational view disclosing details of the floating cap arrangement of FIGS. 1 and 2; and

FIG. 4 is an enlarged side view of the details of FIG. 3; and,

FIG. 5 is a cross-sectional side elevation view taken in a plane passing through line 5-5 of FIG. 1.

Referring to FIG. 2 of the drawing, cupola stack 2 is disclosed including refractory brick lining 3 and metal liner 4. As known in the art, cupola stack 2 is provided with main gas offtake 6 leading to a suitable gas scrubbing apparatus (not shown) and to an ambient atmosphere stack outlet 7.

Provided to close stack outlet 7 during normal furnace melting operations is removable cap member 8. Cap member 8, in

accordance with the present invention, includes lift wall 9 connected at the end of pivotally mounted cantilever beam 11, suitable strengthening rib members 12 extending from cantilever beam 11 and being fastened to the upper portion of lift wall 9 to strengthen such lift wall. The opposite end of cantilever beam 11 is provided with counterweight 13, the beam being pivotally mounted for removable displacement of the lift wall by means of shaft 14, the ends of which are rotatably mounted in spaced bearing blocks 16.

Extending in fixed manner from the lower face of lift wall 9 are a plurality of spaced support arms 17. Support arms 17 serve to support cap wall 18 in a floating manner. To accomplish this, each of the support arms 17 is provided with a longitudinally extending slot 19; each support arm 17 extends intermediate a pair of spaced connecting arms 21 which are fastened to cap wall 18 and which pair of arms 21 have a pin 22 extending normal therebetween and through slot 19 of support arm 17 to thus support cap wall member 18 in spaced floating arrangement from lift wall member 9 and to provide plenum chamber 23 therebetween. Mounted to the lower portion of the cap wall 18 is a suitable refractory lining 24, the cap wall and refractory being sized and adapted to engage with the upper portion of the refractory brick lining of the stack outlet 7 to provide a peripheral seal between the stack outlet and the ambient atmosphere, this seal communicating with plenum chamber 23. As a further seal arrangement, wall 26 is provided along the periphery of lift wall 9 to extend downwardly around plenum 23, the peripheral wall 26 being provided with sealing lip 27 extending normally therefrom which engages with sealing lip 28 of peripheral wall member 29 surrounding stack outlet 7 of the cupola. It is to be noted that the seal formed between the two lips 27 and 28 also is in communication with plenum chamber 23.

As will be noted in FIG. 1 of the drawing, plenum chamber 23 of cap member 8 is provided with an offtake duct 31, which in turn is connected at break flange 32 to duct 33, the duct 33 leading to a suitable area 35 in the metallurgical system having a pressure less than atmospheric, such as between the quencher and the scrubber.

With the arrangement aforescribed, it can be seen that cap 8 is suitably ventilated for any leakage around the peripheral seal formed between liner 24 and stack outlet 7 and any leakages which may occur around the ambient seal formed between lips 27 and 28, the exhaust gases being carried off to a preselected destination through plenum chamber 23 to cool cap 8 from the hot impact gases.

I claim:

1. An exhaust arrangement for a metallurgical cupola comprising: cupola stack means having a main gas offtake and an ambient atmosphere stack outlet; removable cap means for said stack outlet, the peripheral edge of said cap means engaging with the peripheral edge of said stack means providing a peripheral seal to close said stack means from ambient atmosphere during normal cupola melting operations, said cap means having a plenum chamber disposed therein on communication with the peripheral seal between said cap means edge and said stack outlet edge; and duct offtake means in communication with said plenum chamber, said duct offtake means being connected to a pressure source below atmospheric pressure to facilitate removal of any stack gas leakage.

2. The apparatus of claim 1, said cap means including a lift wall and a seal wall, said seal wall being floatingly suspended in spaced relation from said lift wall to define said plenum chamber, the peripheral edge of said seal wall engaging in peripherally sealed relation with the peripheral edge of said stack means outlet.

3. The apparatus of claim 2, said lift wall having a peripheral sidewall depending therefrom including a sealing lip extending from the lower portion thereof, said stack outlet having a sealing lip extending around the outer periphery thereof to sealingly mate with the sealing lip of said sidewall, said plenum of said cap means communicating with said sealing lip to facilitate removal of any ambient atmosphere leakage.