Nov. 25, 1969 J. A. GROSKO 3,480,186

SLIDING GATE FOR METAL-HOLDING VESSEL.

Filed Dec. 22, 1967

FIG. 1.

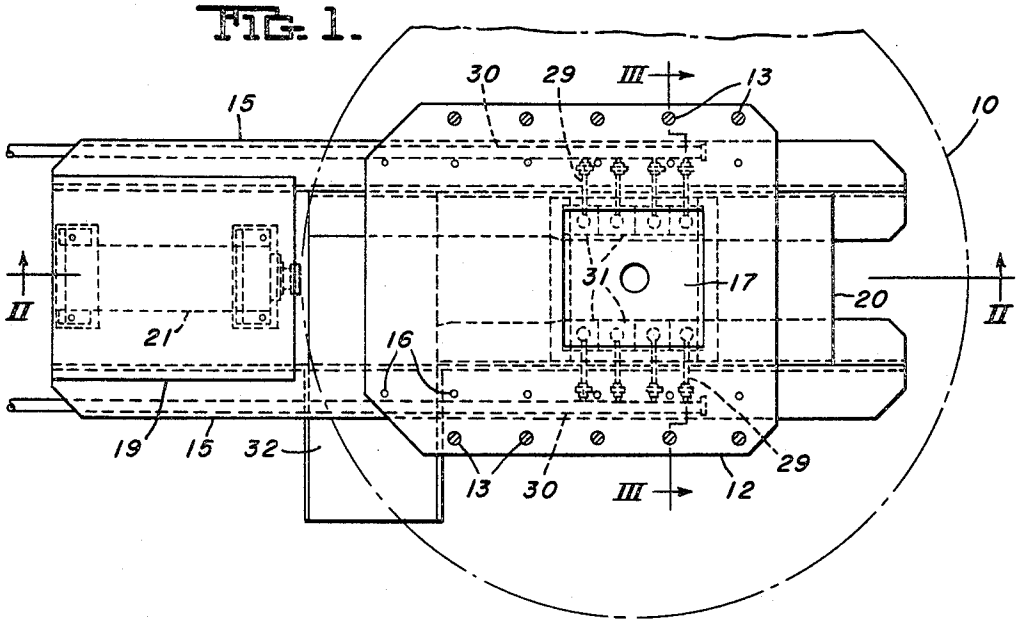


FIG. 2.

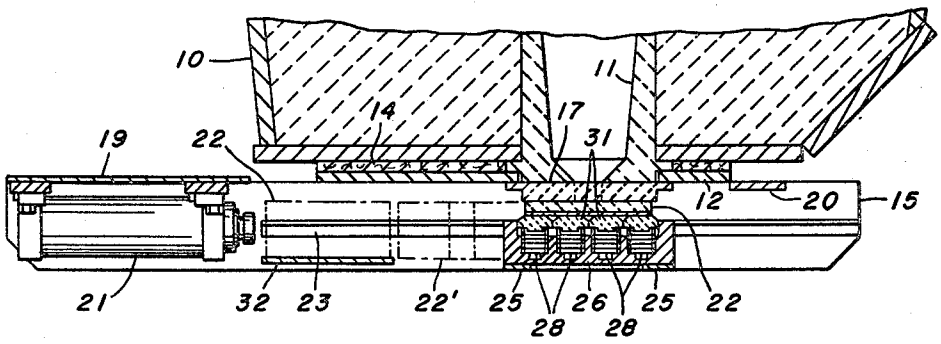
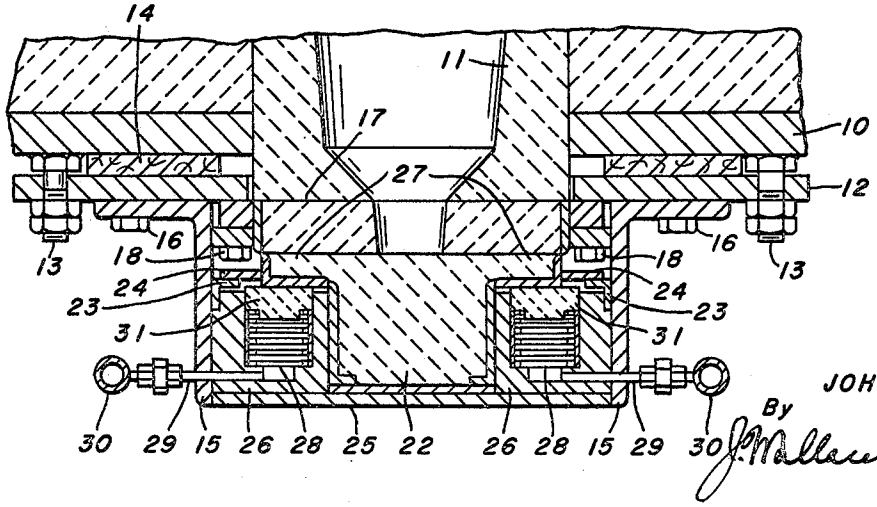


FIG. 3.



INVENTOR.
JOHN A. GROSKO
By J. Wallace Hopkins
Attorney

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SLIDING GATE FOR METAL-HOLDING VESSEL

John A. Grosko, Whitaker Township, Allegheny County, Pa., assignor to United States Steel Corporation, a corporation of Delaware

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U.S. Cl. 222—512 2 Claims

ABSTRACT OF THE DISCLOSURE

A metal-holding vessel with a bottom outlet has spaced beams secured therebelow, one on each side of the outlet and a closure panel slidably supported on the beams is adapted, in one position, to close said outlet. Expansible-chamber motors are carried by the beams on each side of the panel and constantly urge it toward the bottom of the vessel. Graphite blocks between the motors and the panel facilitate movement of the latter and protect the motors from the heat of the metal. Another motor mounted on the beams actuates the panel to open or close the vessel outlet.

BACKGROUND OF THE INVENTION

This invention relates to means mounting a closure panel for sliding movement on the bottom of a metal-holding vessel having a bottom outlet and, in particular, to the means for urging the panel firmly against the vessel bottom so it will effect a tight closure of the outlet.

More specifically, my invention is an improvement on the apparatus of Shapland Patent No. 3,352,465. That patent shows a sliding closure panel urged against the vessel bottom by compression springs working through levers of the first class. These springs are located relatively close to the stream of hot metal flowing from the vessel when the panel is in open position and may be adversely affected by the heat therefrom.

SUMMARY OF THE INVENTION

According to my invention, I provide a plurality of expansible chamber motors on each side of the path of the closure panel, disposed and arranged to exert a direct upward force thereon tending to seat the panel firmly against the bottom outlet of the vessel. I further provide graphite bearing blocks between the motors and the panel to facilitate movement of the latter and protect the former from excessive heat.

BRIEF DESCRIPTION OF THE DRAWINGS

A complete understanding of the invention may be obtained from the following detailed description and explanation which refer to the accompanying drawings illustrating the present preferred embodiment. In the drawings:

FIGURE 1 is a plan view of my invention separate from the vessel on the bottom of which it is adapted to be mounted;

FIGURE 2 is a longitudinal vertical section taken along the plane of line II—II of FIGURE 1, with parts in elevation, showing partially the bottom of the vessel to which my invention is secured; and

FIGURE 3 is a partial cross section taken along the plane of line III—III of FIGURE 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to the drawings, a refractory-lined vessel **10** adapted to hold molten metal, such as a ladle or the like, has a bottom outlet defined by a nozzle block **11**, controlled by a conventional stopper rod (not shown). A plate **12** is secured by bolts **13** to the bottom of the vessel with a layer of thermal insulating board **14** therebetween. This plate has a central hole therein to accommodate the projecting lower end of nozzle block **11**. Angle beams **15** are secured to plate **12**, one on ecah side of the nozzle block, by screws **16**. A nozzle-block support plate **17** having a central hole adapted to register with that through block **11** is secured to plate **12** by screws **18**. Beams **15** are connected by upper cross plates **19** and **20** welded thereto.

A cylinder and piston **21** mounted on plate **19** effect sliding movement of a closure panel **22** along ways **23** on the inner faces of beams **15**, from the chain-line to the solid-line position shown in FIGURE 2. When the panel is in registry with plate **17**, it blocks flow of metal through nozzle block **11**. The panel has lateral flanges **24** riding on ways **23**.

Lower cross plates **25** extending between beams **15** support motor-housing blocks **26**, one on each side of the path of panel **22**. As shown in FIGURE 3 the panel has shoulders or flanges **27** overhanging blocks **26**. While made principally of refractory material, the panel is metal clad on its lower surfaces. Blocks **26** are bored to receive a plurality of expansible-chamber motors **28**, such as bellows, and connections **29** extend therefrom to manifolds **30** connected to a suitable source of fluid under pressure through a control valve (not shown). Graphite blocks **31** are disposed between motors **28** and shoulders **27**, the upper surfaces of blocks **26** being recessed to accommodate them. Blocks **31** have their edges beveled, as shown in FIGURE 2, so that shoulders **27** will not be obstructed as panel **22** is pushed into place.

It will be evident that motors **28**, acting through blocks **31**, exert a constant upward pressure on panel **22**, tending to hold it closely against the plate **17**. This pressure may be increased, if necessary, by opening the control valve and relieved, if excessive, by a conventional safety valve.

When it is desired to permit metal flow through block **11**, a panel **22'** having a hole therethrough is placed on loading shelf **32** and motor **21** is operated to push it into registering position, such action, of course, also effecting removal of closed panel **22** previously in position. To terminate flow, panel **22** is replaced in the position shown.

Although I have disclosed herein the preferred embodiment of my invention, I intend to cover as well any change or modification therein which may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. The combination, with a metal-holding vessel having a bottom outlet and a flow-control panel slidable thereover, of support means for said panel comprising a pair of spaced parallel beams secured to the bottom of

said vessel, ways on the adjacent faces of said beams, said panel having laterally extending flanges along its sides slidable on said ways, a block carried by each of said beams extending along one side of said panel, and a plurality of expansible-chamber motors spaced along each block adapted to exert pressure urging said panel toward the vessel bottom.

2. An apparatus as defined in claim 1, characterized by individual graphite blocks between said motors and said panel.

References Cited

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STANLEY H. TOLLBERG, Primary Examiner

U.S. Cl. X.R.

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