March 24, 1925. 1,530,972

F. B. ALLEN

WALL CONSTRUCTION

Filed April 16, 1923

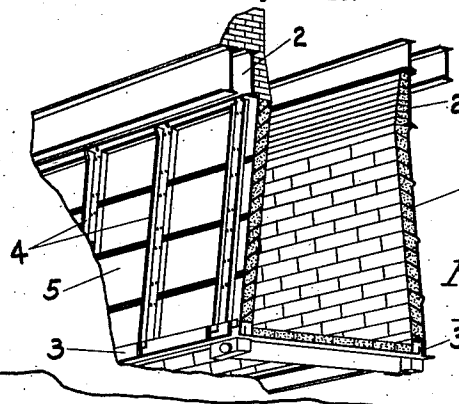


Fig. 1

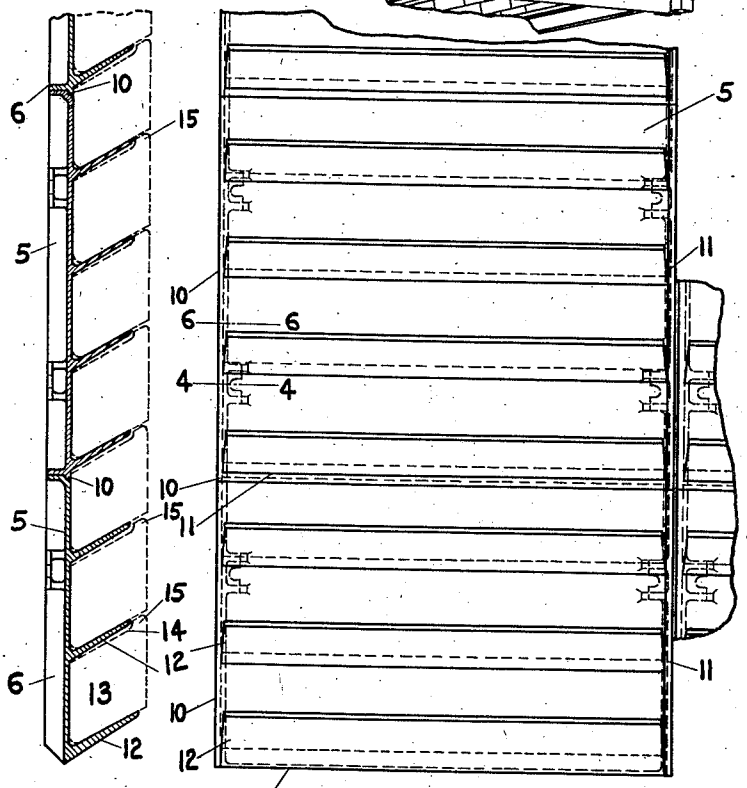


Fig. 3

Fig. 2

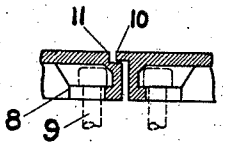


Fig. 4

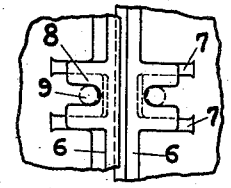


Fig. 5

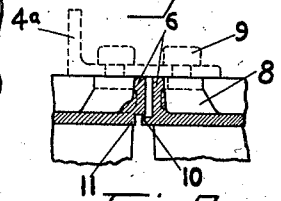


Fig. 6

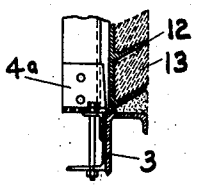


Fig. 7

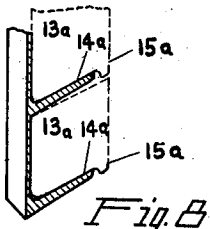


Fig. 8

FRANK B. ALLEN *INVENTOR.*

BY Richey Slough + Watts

HIS ATTORNEYS

Patented Mar. 24, 1925. 1,530,972

UNITED STATES PATENT OFFICE.

FRANK B. ALLEN, OF PHILADELPHIA, PENNSYLVANIA.

WALL CONSTRUCTION.

Application filed April 16, 1923. Serial No. 632,326.

To all whom it may concern:

Be it known that I, FRANK B. ALLEN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Wall Construction, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to wall construction, particularly walls for ash hoppers. It is concerned primarily with a wall comprising sectional plates provided on one side with means for attachment to a skeleton framework and on the other side with integral means for removably supporting separate lining units of new and improved configuration.

One object of the invention is to provide a metal wall unit or element having means located on its exterior surface for engagement with securing means, such as bolts, thereby avoiding perforations through the unit for such securing means.

Another object is to provide a metal wall unit or element having on its interior surface inclined flanges or projections adapted to support lining elements or units throughout a relatively wide range of inclination of the wall units with respect to the vertical.

Another object is the provision of a wall lining element or unit preferably composed of refractory material and of such a cross-sectional configuration as will render it capable of being supported, without securing means, against dislodgement throughout a relatively wide range of angular inclination of the wall element with respect to the vertical.

A further object is to construct a wall lining unit having substantially equal rectangular sides and being rectangular in cross section with opposite included angles of approximately 60°.

Further objects will appear and be pointed out hereinafter in the description of a practical embodiment of my invention.

In the drawing accompanying this application and forming a part thereof,

Fig. 1 is a fragmentary perspective view of an ash hopper constructed in accordance with my invention.

Fig. 2 is a side view in elevation of several wall units forming the wall of the hopper shown in Fig. 1, as the units appear from the interior of the hopper.

Fig. 3 is a cross sectional view taken substantially on line 3—3 of Fig. 2.

Fig. 4 is a fragmentary cross-sectional view taken substantially on line 4—4 of Fig. 2.

Fig. 5 is a fragmentary view of the securing lugs on the outside of the wall units.

Fig. 6 is a fragmentary cross-sectional view taken on line 6—6 of Fig. 2.

Fig. 7 is a fragmentary detailed view partly in section showing the co-relation of parts at the lower end of a hopper.

Fig. 8 is a fragmentary sectional view showing a modified form of lining unit.

On the drawing 1 indicates as an entirety a hopper suspended from supporting means, such as girders 2, and having at its lower end a suitable frame member 3 forming the lower end of the hopper and provided with openings through which ashes collected in the hopper may be discharged at will. Member 3 is suspended from member 2 in any suitable manner, for example, by spaced uprights 4. Members 2, 3 and 4 thus comprise a skeleton structure to which may be secured the wall forming units constructed in accordance with my invention. 5 indicates units or plates which cooperate to form a substantially solid or continuous wall and which include means for engagement with other means to secure the units in position. Preferably these units are composed of substantially rectangular cast iron bodies provided on their outer surfaces with an upstanding flange or rib 6 along the marginal edges thereof to serve mainly as strengthening means.

The units may be secured to spaced uprights 4 by having slotted lugs formed therein adjacent to the uprights which lugs, in the form illustrated, comprise pairs of short substantially parallel ribs 7 integral with the rib 6 and united at their edges by a web 8 slotted as shown in Figs. 4 and 5 to receive the shank of a bolt, the head of which is retained by the web 8 within the recess formed by the ribs 6 and 7. These lugs are positioned with respect to the uprights 4 so that the bolts 9 may pass through suitable openings in the uprights and thus secure each plate or unit to one or more uprights. Such securing means being formed entirely on the exterior surface of the unit leaves the unit free from holes through which water could flow from the interior of the hopper.

The wall units or plates 5 cooperate to form a substantially solid or continuous wall by reason of the overlapping portions. Each unit is preferably constructed with two over-hanging flanges 10 and two recesses 11 to receive corresponding flanges 10 on adjacent units. Preferably flanges 10 are formed along one vertical side and the bottom edge of a unit and recesses 11 are formed along the upper edge and the remaining vertical side. By this construction seepage of water through the horizontal junction of the plates with one another will be substantially prevented and seepage through the vertical junction will be greatly minimized, if not entirely prevented.

The units may also be provided with lining supporting means. In the form shown the inner surface of each wall unit 5 has formed integrally therewith a plurality of flanges 12 extending upwardly and at an acute angle thereto. These flanges extend in a horizontal plane or parallel with the upper and lower edges of the units and serve as means for supporting the fire brick lining units 13. Each flange 12 extends outwardly from the inner surface of the wall unit preferably to a distance slightly less than the depth of the refractory lining units, as will be clearly noted by reference to Fig. 3.

Each lining unit 12 is of substantially rectangular cross-section, having at its rear lower longitudinal edge an included acute angle of substantially the same size as the acute angle between the upper surface of the flange 12 and the inner surface of the unit 5.

The units 13 may vary in length but preferably are of a size suitable for convenient handling. In depth, that is distance from the front or exposed face to the rear surface or that surface adjacent the inner surface of unit 5, is slightly greater than the corresponding length of the flanges 12. The upper surface of each unit 13 is suitably recessed or relieved as at 14 to receive the corresponding flange 12 next above the unit but it will be noticed that the relief 14 does not extend entirely to the front surface of unit 12 and that accordingly there is a longitudinally extending ridge 15, along the front upper edge of the unit which overlaps the edge of the flange 12 above the unit 13 and lies in close contact with the lining unit supported on each flange thereabove thereby effectually preventing direct contact with the flange of heated materials or other substance in the hopper which might have a harmful effect on the metal comprising the flanges. If desired, a lining unit 12^a may be employed having a recess 14^a and ridge 15^a similar to the corresponding recess 14 and ridge 15 of unit 12 but located on the bottom surface of the unit instead of on the top surface. Ridge 15^a would then over-lap the end of the flange 12 which supports the unit as shown in Fig. 8.

It will be noted that each lining unit 13 is supported on an upwardly extending flange 12 of the wall unit 5 and will be held in place without any securing means other than the flange, even though the wall unit may be inclined with respect to a vertical position to such an extent that the supporting flanges become substantially horizontal. This is due primarily to the cross sectional configuration of the lining units 13 and to the spacing apart of the flanges and to the length of the flange away from the surface of unit 5. Each unit 13 may obviously be removed from its supporting flange by sliding it outwardly parallel therewith, independently of and without disturbing any other lining unit or any part of the wall section 5, this fact makes renewal of broken lining units particularly inexpensive and simple.

Due to the formation of an acute angle at the lower rear longitudinal edge of the lining unit 13 which fits into the space between the inner surface of unit 5 and the upper surface of the supporting flange 12 and due also to the extension of the supporting flange to a point near the outer surface of the lining unit, any tendency for the lining unit to pivot about the outer edge of the supporting flange and thus fall out of place is effectually prevented. The rear longitudinal edges of the lining unit would contact respectively with the inner surface of the unit 5 and the lower surface of the supporting flange 12 next above if there should be any tendency for pivoting of the unit 13 about the edge of flange 12. This action is present also when the wall unit 5 is inclined to the vertical so as to bring the supporting flange more nearly into a horizontal plane and even when the inclination thereof has become sufficient so that the upper surface of the flange is substantially horizontal the lining unit 12 will not be dislodged easily nor slide out of place because of their own weight.

Furthermore, it will be obvious that due to the cross-sectional configuration of the lining unit and the size and location of the supporting flange therefor any breaking of the lining units, except possibly the chipping off of the front longitudinal corners will not render the unit unfit for further use because the parts will still be retained in position on the supporting flange. Accordingly a hopper constructed in accordance with my invention can be operated for some time after the bricks have cracked in this manner before a new lining unit is inserted to replace the broken one, thus materially reducing the maintenance expense of

hopper wall construction since repairs to the wall could be made at more widely spaced intervals.

For lining the wall at corners and between the lowermost supporting flange 12 and members 3 (Fig. 7) mortar, or lining units 12 broken into suitable form and secured in place in any suitable manner may be employed as will be understood by those skilled in the art.

Although I have described my invention in some detail as embodied in a wall for an ash hopper, I do not desire to limit it to such construction since it is obviously applicable to use wherever it is desired to employ a sectional wall which functions substantially as if continuous, is adapted to prevent leakage of liquid therethrough, is supported exteriorly and capable of supporting lining units.

Having thus described my invention what I desire to secure by Letters Patent is defined by what is claimed, it being understood that modifications and changes within the range of mechanical skill may be made without departing from the scope of my invention.

What is claimed is:

1. A sectional metal wall for a hopper comprising a plurality of spaced metal uprights, and including a plurality of substantially rectangular imperforate cast iron wall plates disposed within and supported by the said uprights, each wall plate having a liner supporting flange cast integrally with and extending at an acute angle to the inner side thereof.

2. A sectional wall for a hopper comprising spaced metal uprights, and including a plurality of imperforate cast iron wall plates supported by the said uprights, each plate comprising a substantially rectangular flat body having a liner supporting flange disposed substantially parallel to the bottom edge thereof and inclined at an acute angle to the inner side of the body, and a plurality of independently removable lining units carried by the said flanges.

3. A sectional wall for a hopper comprising spaced uprights, and including a plurality of imperforate cast iron wall plates supported thereby, each unit comprising a flat body having liner supporting flanges extending at an acute angle to the inner side thereof and substantially parallel to the bottom edge thereof, and a plurality of independently removable lining units carried by the said flanges, the lining units having transverse cross sectional shape and dimensions substantially the same as the space between each flange and the adjacent portion of the body.

4. A sectional metal wall for a hopper comprising spaced metal uprights, and including imperforate cast iron wall plates within and supported by said uprights, each wall plate engaging two adjacent uprights and consisting of a flat body having a flange extending at an acute angle to the inner side thereof, and independently removable liner units carried in substantially horizontal rows by the said flanges.

5. A sectional metal wall for a hopper comprising spaced metal uprights, cast iron wall plates within said uprights and each bridging the space between two adjacent uprights, each wall plate consisting of a flat body having on the exterior thereof means for attaching the plate to the uprights and having on the interior thereof a flange extending at an acute angle thereto, and independently removable liner units carried in substantially horizontal rows by the said flanges.

6. A sectional, substantially liquid-tight, metal wall comprising in combination, spaced metal uprights, peripherally overlapping metal wall plates having slotted lugs formed on the exterior surface thereof adjacent to the uprights, and bolts engaging the said lugs and securing the plates to the said uprights.

7. A sectional, substantially liquid-tight metal wall comprising in combination, spaced metal uprights, cast iron wall plates within the uprights, each plate bridging the space between two adjacent uprights and being assembled in overlapping arrangement with the plates adjacent thereto, each plate having a flange inclined at an acute angle to the inner surface thereof for supporting independently removable liner units and having on the outer side means for securing the plate to the said uprights, the last said means each including a rib along the peripheral edge of the said plate and adjacent to an upright, pairs of short ribs joining the upstanding rib at substantially right angles thereto, a slotted web bridging the space between the pair of short ribs and means removably engaging the slotted webs for securing the plate to the upright.

8. A sectional metal wall for a hopper comprising spaced metal uprights, flat metal wall plates supported thereby having means on their exterior for securing the plate to an upright, the said means comprising an upstanding peripheral rib on the plate, a pair of short ribs joining the said rib at an angle thereto, and a slotted web joining the outer edge of the said short ribs and the adjacent portion of the peripheral rib, and means engaging the said slotted web and adjacent upright for securing the two together.

9. A sectional metal wall for a hopper comprising spaced metal uprights, and including substantially rectangular metal wall units supported by the uprights, each unit

consisting of a cast iron body free from perforations extending therethrough and having a lug secured on the exterior thereof, and means detachably engaging the lug for securing the unit to an upright.

10. A sectional metal wall for a hopper comprising spaced metal uprights, substantially rectangular wall plates supported thereby, each consisting of a cast iron body free from perforations extending therethrough and having lugs formed integrally with the exterior side thereof, and means detachably engaging the said lugs for securing the wall plates to two adjacent uprights.

11. A sectional metal wall comprising spaced metal uprights, and including substantially rectangular, cast metal, wall units free from perforations extending therethrough and supported by the uprights, and means for securing the said plates to the said uprights, said means comprising lugs cast integrally with the exterior of the plates and bolts engaging with the lugs and adjacent uprights to secure the same together.

In witness whereof, I hereunto affix my signature this 13th day of April, 1923.

FRANK B. ALLEN.