Jan. 11, 1944. T. B. ALLARDICE 2,339,216

HOPPER WITH METAL BOTTOM

Filed Sept. 27, 1941 2 Sheets-Sheet 1

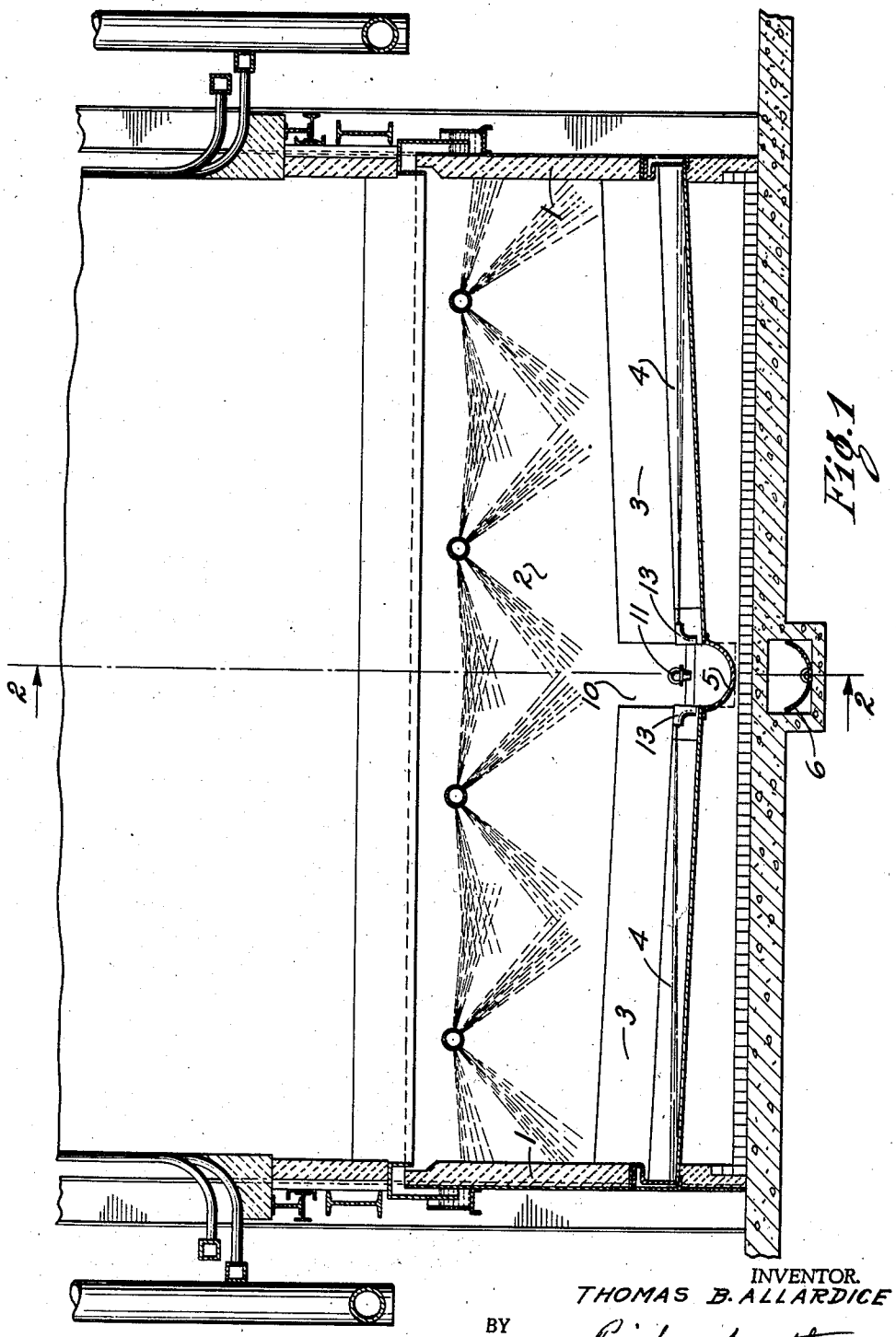


Fig. 1

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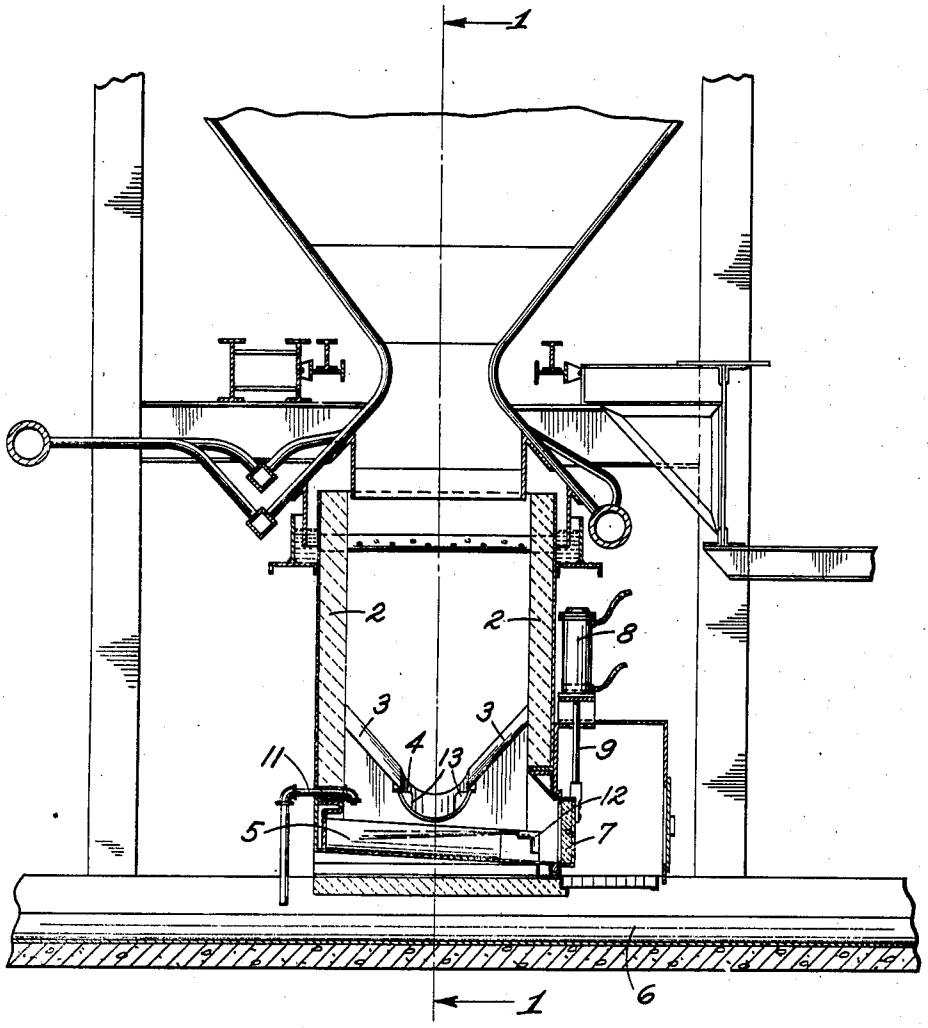


Fig. 2

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HOPPER WITH METAL BOTTOM

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6 Claims. (Cl. 110—165)

This invention relates to dry ash hoppers and particularly to such hoppers having water cooled, abrasion resistant bottom walls.

Prior, so-called dry hoppers have had bottom walls which presented refractory lining material to the ashes. Such walls were expensive to install and the refractory material was worn away more or less rapidly by abrasion caused by the movement of ashes thereon. The present invention avoids these disadvantages of the prior art by providing a hopper having metal bottom walls which are relatively cheap to make and install and which are quite resistant to abrasion and, therefore, possess greatly increased length of life.

In prior hoppers, particularly those employed with furnaces of large steam generating capacity, difficulty has been encountered in removing ashes from hoppers of the large size required by such furnaces. By the present invention I am able, without difficulty, to remove ashes from hoppers which are as much as 30 feet or more in length and 5 feet or more in width. I accomplish this result by providing centrally disposed longitudinally extending bottom walls which slope toward the center of the hopper and a centrally disposed transversely extending bottom wall which slopes downward to a point outside of one side wall where material passing thereover may be received in a pipe or sluiceway for transportation to a place of disposal.

In the drawings accompanying and forming a part of this specification,

Figure 1 is a longitudinal, vertical, sectional view of one form of hopper embodying the present invention; and

Figure 2 is a transverse sectional view of the apparatus shown in Figure 1 and taken on line 2—2 of that figure.

In the drawings the hopper is composed of end walls 1, side walls 2 and refractory bottom walls 3. Metal walls 4, preferably composed of cast iron and preferably curved in cross section as shown, are disposed in walls 3 centrally of the hopper and slope downwardly from the end walls 1 of the hopper. The adjacent ends of walls 4 are fairly close to each other. Metal wall 5, likewise, which is preferably composed of cast iron and preferably of curved cross sectional shape, is disposed centrally of the hopper in walls 3 and slopes downwardly from one side wall 2 to, and projects thru, the opposite side wall 2 where its outer end is above a sluiceway 6. The opening in the side wall 2 thru which wall 5 projects is closed by a door 7 which may be lifted by any suitable means, such as the cylinder 8 having a piston (not shown) on the rod 9 attached to the door 7. The door 7 is sufficiently close fitting to prevent escape of water from the hopper. It will be noted that bottom walls 3 are cut away above wall 5, as indicated at 10.

An overflow pipe 11 leads from the interior of the hopper, preferably thru a side wall 2, at a point above the transverse bottom wall 5 and serves to prevent water rising in the hopper above the level of the overflow pipe. It will be understood that when water is sprayed or otherwise brought into the hopper the water will quickly rise to the overflow level, thereby covering the metal walls 4 and 5 and protecting them against radiant heat from the combustion chamber above the hopper. This continual flow of water into and out of the hopper maintains the metal walls 4 and 5 at a relatively low temperature. In the event that there is not sufficient water sprayed into the hopper to maintain a covering of water over the metal walls 4 and 5, additional water may be supplied to the hopper directly from any suitable source.

Adjacent to the lower end of wall 5 are disposed one or more nozzles 12, which, when supplied with high pressure water, will direct a stream or streams of water against the adjacent face of ashes on said wall. When the door 7 is open and water is supplied to these nozzles 12, ashes on wall 5 will be washed into sluiceways 6, and ashes in and about the space 10 will be removed from the hopper. Adjacent to the lower ends of walls 4 similar nozzles 13 are disposed to direct streams of high pressure water against the opposed faces of ashes on walls 4. These nozzles form a restriction at the lower end of each wall 4 which helps to control the rate of removal of ashes from each wall 4 onto wall 5. After the ashes have been removed from wall 5 and thereabove by nozzles 12, ashes may be washed from walls 4 and the walls 3, onto wall 5 by nozzles 13, and thence washed into the sluiceway by nozzles 12. Alternatively, all the nozzles may be turned on at the same time but this procedure is less desirable.

It will be noted that the above described apparatus includes bottom walls in the hopper which are highly resistant to abrasion and are protected against the radiant heat of the combustion chamber by cooling water; and, furthermore, that ashes may be hydraulically removed from hoppers of great length and width by means of the illustrated arrangement of longitudinal and transverse sloping walls and high pressure water nozzles.

Having thus described my invention so that others skilled in the art may be able to understand and practice the same, I state that what I desire to secure by Letters Patent is defined in what is claimed.

What is claimed is:

1. An open topped dry ash hopper to receive hot ashes from a combustion chamber thereabove, said hopper having end and side walls, a central, transverse, metal bottom wall sloping downwardly from one side wall and extending thru the opposite side wall of the hopper, central, longitudinal, metal bottom walls sloping upwardly from said transverse wall toward each end wall of the hopper, means near the lower end of the transverse wall to direct high pressure water against ashes on said wall, and means near the lower ends of the longitudinal walls to direct high pressure water against ashes on said walls.

2. An open topped dry ash hopper to receive hot ashes from a combustion chamber thereabove, said hopper having side and end walls, refractory bottom walls with transverse, downwardly converging top surfaces and with vertical walls defining a space between the adjacent longitudinal ends thereof, longitudinally extending, metal bottom walls joining the said converging top surfaces and sloping downwardly to said space, nozzles disposed in the adjacent ends of said longitudinally extending metal walls to direct high pressure water against ashes thereon, a transversely extending metal bottom wall in said vertical space and beneath the adjacent ends of said longitudinally extending metal walls and extending downwardly from a hopper wall, and a nozzle near the lower end of the transversely extending metal bottom wall to direct high pressure water against ashes thereon.

3. An open topped dry ash hopper to receive hot ashes from a combustion chamber thereabove, said hopper having end and side walls, a central, transverse, metal bottom wall sloping downwardly from one side wall and extending thru an opening in the opposite side wall of the hopper, a water retaining door for said opening, central, longitudinal metal bottom walls sloping upwardly from said transverse wall toward each end wall of the hopper, means near the lower end of the transverse wall to direct high pressure water against ashes on said wall, means near the lower ends of the longitudinal walls to direct high pressure water against ashes on said walls, and overflow means to limit the rise of water substantially above said longitudinal metal walls.

4. An open topped dry ash hopper to receive solid ashes from a combustion chamber thereabove, said hopper having side and end walls and refractory, longitudinally and transversely sloping bottom walls, a plurality of metal walls disposed lengthwise on said refractory walls, certain of said metal walls only partially covering the refractory bottom walls on which they are disposed, one of said metal walls projecting thru a side wall of the hopper, means to admit water into the hopper, and means for retaining water in the hopper to a level slightly above the top surfaces of said metal walls.

5. An open topped dry ash hopper to receive solid ashes from a combustion chamber thereabove, said hopper having side and end walls and refractory, sloping bottom walls, and a plurality of sloping metal walls disposed lengthwise on said refractory bottom walls, one of said metal walls sloping downwardly from a hopper side wall and projecting thru the opposite hopper side wall, and another of said metal walls sloping upwardly from a point above said downwardly sloping metal wall to an end wall of said hopper and only partially covering the refractory bottom wall on which it is disposed, means to admit water into the hopper, and means for retaining water in the hopper to a level slightly above the top surfaces of said metal walls.

6. An open topped dry ash hopper to receive solid ashes from a combustion chamber thereabove, said hopper having side and end walls, refractory bottom walls including a transversely sloping bottom wall, a plurality of longitudinal walls sloping downwardly toward said transverse wall, a metal wall disposed on said transversely sloping bottom wall and extending from one hopper side wall and projecting thru the opposite hopper side wall, and metal walls disposed lengthwise on and only partially covering said longitudinal bottom walls and sloping upwardly from above said transverse metal wall to the opposite end walls of said hopper, means to admit water into the hopper, and means for retaining in the hopper a body of water having a surface level slightly above the highest parts of said metal walls.

THOMAS B. ALLARDICE.