April 25, 1933. R. A. FORESMAN 1,905,223

ASH DISPOSAL APPARATUS

Filed Nov. 14, 1931 2 Sheets-Sheet 1

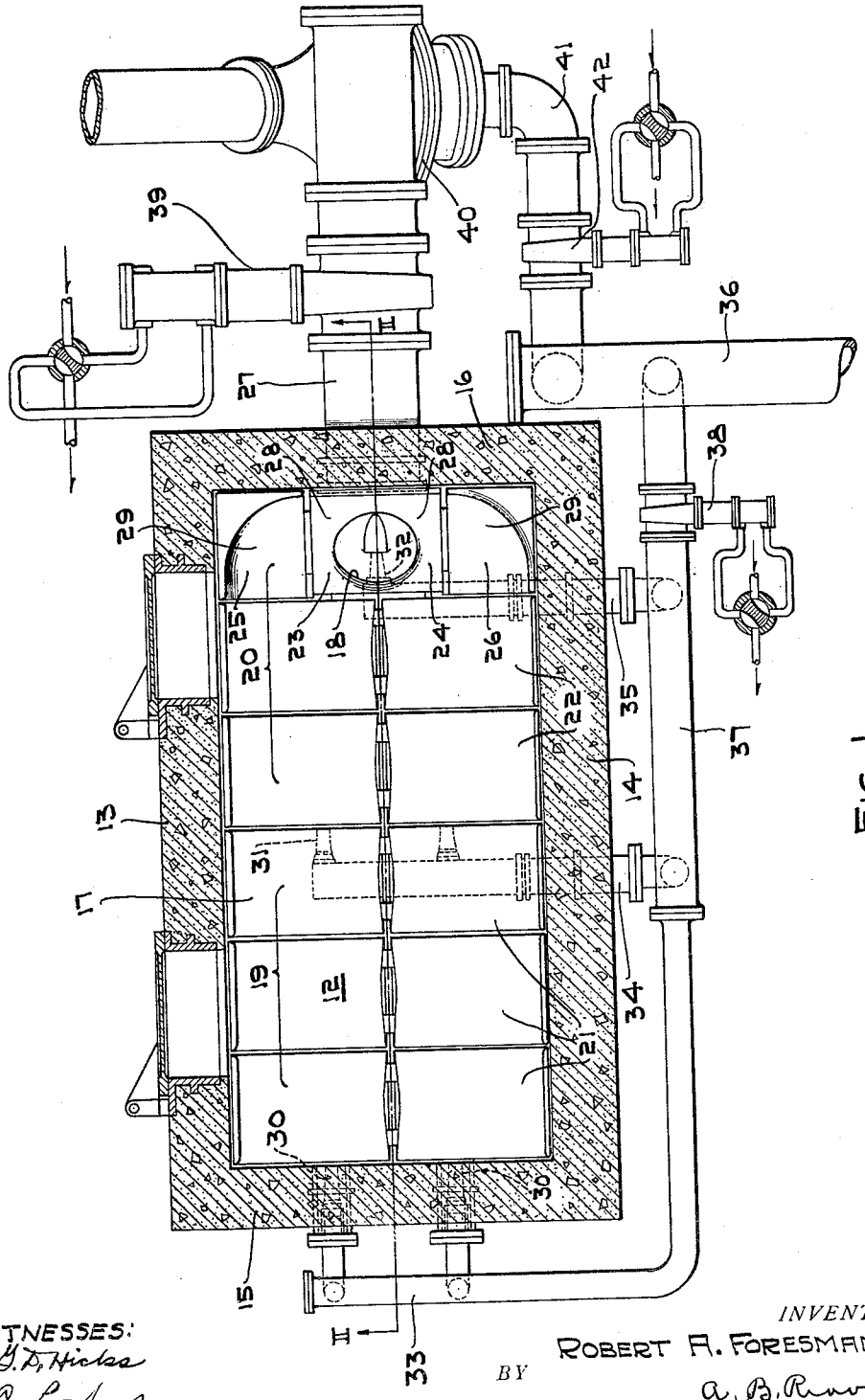


FIG. 1.

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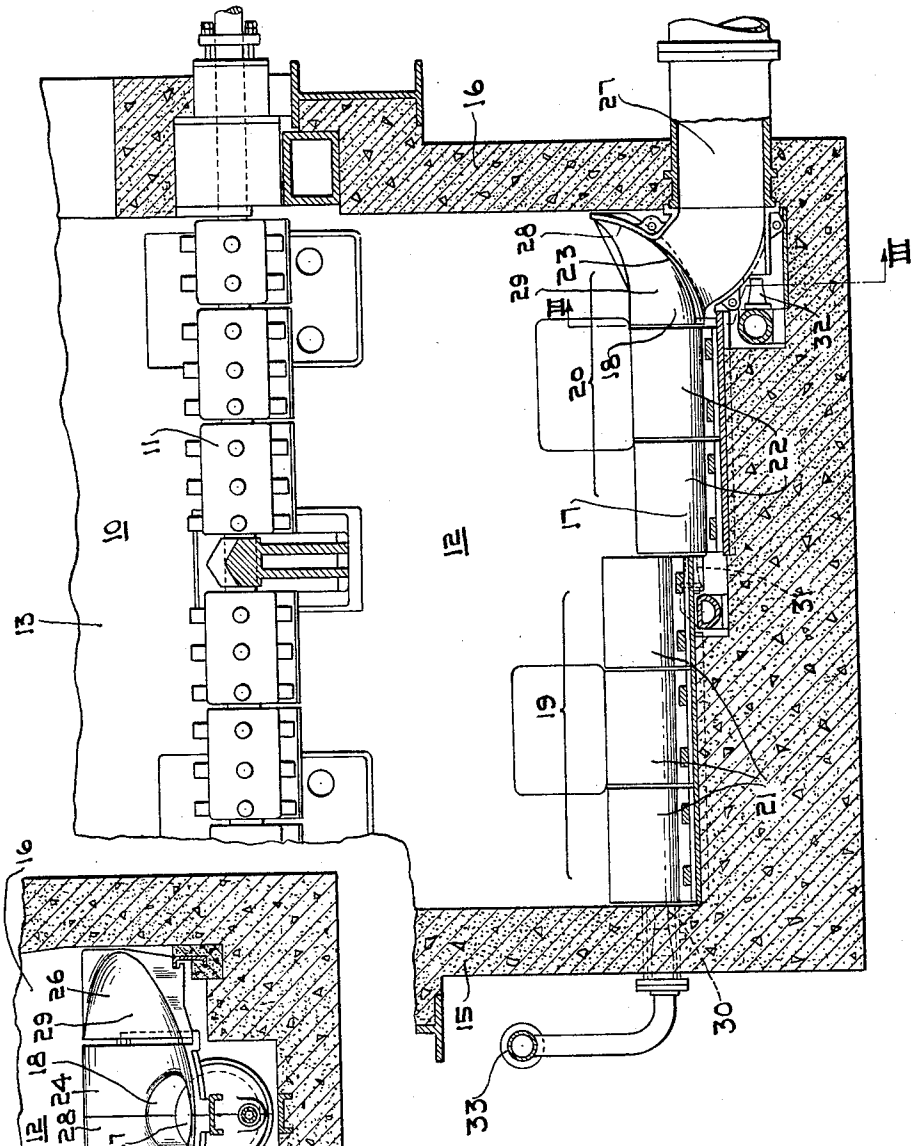


FIG. 2.

FIG. 3.

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UNITED STATES PATENT OFFICE

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ASH DISPOSAL APPARATUS

Application filed November 14, 1931. Serial No. 575,081.

My invention relates to combustion apparatus and more particularly to ash storage pits of the type which are adapted to receive and store over extended periods of time the ash discharged from fuel burning structures and then be emptied in a relatively short period of time. This application is a continuation in part of my copending application, Serial No. 553,443, filed July 27, 1931 and assigned to the Westinghouse Electric and Manufacturing Company.

In ash pits of this character, heretofore known to me, it is usually the practice to provide a discharge opening in the bottom wall and adjacent one end thereof, which opening is controlled by any suitable closing means, such for example, as a gate valve. Also, in this type of apparatus, it is conventional to provide a means for translating or moving the ash toward the discharge opening during the period of emptying the pit. This latter means is usually in the form of water jets so arranged as to effect the movement of the ash in the manner outlined. In this type of apparatus, difficulty has been encountered during emptying periods for the reason that the larger particles of ash will collect adjacent to and in the opening and thereby cause the ash to clog or arch over the opening which either interferes with or prevents the movement of ash through the discharge opening. Sometimes it becomes necessary to remove part of the ash from the pit and to then break down the arch by suitable tools, all of which involves considerable delay, labor and expense.

It is therefore an object of this invention to provide ash disposal apparatus of this character which is improved in construction and arrangement of parts, and one in which the clogging up or arching over of the discharge opening is effectively prevented.

This and other objects are effected by my invention, as will be apparent from the following description and claims, taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a horizontal sectional view of an ash pit constructed in accordance with my invention, showing the bottom wall of the pit and the discharge opening in plan;

Fig. 2 is a longitudinal vertical sectional view taken on the line II—II of Fig. 1, with portions being broken away; and,

Fig. 3 is a fragmentary transverse sectional view taken on the line III—III of Fig. 2.

According to a preferred embodiment of my invention, I provide an ash pit comprising a pair of longitudinally-extending side walls, transversely-extending end walls, and a longitudinally-extending bottom wall having a discharge opening disposed at one end thereof and adjacent one of the end walls. That portion of the bottom wall which is disposed between the discharge opening and the adjacent end wall and the portion which extends between the discharge opening and adjoining side walls are inclined upwardly and away from the discharge opening and toward the side and end walls respectively. I also provide in the end wall opposite to the discharge opening and in the bottom wall a plurality of water jets which are arranged to direct streams of water at relatively high velocities along the bottom wall and toward the discharge opening.

The result of this arrangement will be that, during emptying or discharge periods, the water jets will force the ash and refuse toward the discharge opening and any material which would tend to clog or arch over the discharge opening will be forced past the opening and upwardly and along the inclined portions of the bottom wall. The material which passes the opening will fall again into the path of the jets and will continue to do so until it passes through the discharge opening. In other words, the jets and inclined portions of the bottom wall

will cooperate to move away from the opening any material which does not readily enter thereinto.

Referring now in detail to the construction illustrated, the reference numeral 10 indicates the lower portion of the clinker pit which forms a part of a stoker-fired furnace. As is well known, during operation of this type of structure, the refuse is deposited within the clinker pit and is gradually removed therefrom by means of suitable crusher rolls 11 disposed in the lower portion of the pit.

An ash pit 12 is disposed beneath the crusher rolls and comprises side walls 13 and 14 and end walls 15 and 16 which are in effect continuations of the side and end walls of the clinker pit. The ash pit also comprises a bottom wall 17 having a discharge opening 18 formed in the end thereof adjacent the end wall 16.

The bottom wall is preferably formed of a plurality of groups of removable cast iron sections. In the drawings, I have shown two such groups and they are indicated by the reference characters 19 and 20 respectively, the group 19 being disposed adjacent the end wall 15 and at a higher level than the group 20, which latter is disposed adjacent the end wall 16. The group 19 is formed of cast iron sections 21 of unit size. The group 20 includes sections 22 which are identical with the sections 21. However, the extreme lower end portion of the latter group is composed of a plurality of specially formed cast-iron sections indicated by the reference numerals 23, 24, 25 and 26.

The sections 23 and 24 are disposed at the center and adjacent the end wall 16. These two sections 23 and 24, when in position, provide the discharge opening 18 and the beginning of an ash discharge passage or pipe 27 communicating with the opening 18. The sections 25 and 26 are disposed at the opposite sides of the sections 23 and 24. The opening 18 is inclined as shown to permit the ready entrance of ash. Above the opening 18 the sections 23 and 24 are provided with upwardly-inclined surfaces 28 which extend toward the end wall 16. The sections 25 and 26 are provided with inclined surfaces 29 which slope upwardly and away from the sides of the discharge opening and toward the adjacent portions of the side walls.

In order to move the ash toward the discharge opening and to effect its discharge from the pit, I provide a plurality of nozzles 30, 31, and 32, the nozzles 30 being located in the end wall 15, the nozzles 31 in the bottom wall and beneath the end of the group 19 of cast iron sections, and the nozzle 32 being located in the pipe 27. The nozzles 30 and 31 are arranged to direct high velocity streams of water along the bottom wall of the pit and toward the opening 18 and the nozzle 32 serves to force the water and ash through the pipe 27. The nozzles 30, 31, and 32 receive their supply of water from branch pipes 33, 34, and 35 respectively, the pipes being connected to a main supply pipe 36 by a pipe 37. Control of the flow of water to the nozzles may be effected by a suitable gate valve 38 in the pipe 37.

Flow of ash and water through the discharge opening 18 is controlled by a suitable gate valve 39 disposed in the pipe 27. The ash and water is forced through the pipe 27 and to a final point of discharge by an ejector 40. The ejector is motivated by water from a pipe 41 connected to the main supply pipe 36. A gate valve 42 controls the flow of motivating water to the ejector.

During storage periods, the ash pit is maintained full of water, and deposited into the ash pit by virtue of the action of the crusher rolls 11. When the ash pit 12 becomes full of ash, the ejector is turned on by opening the valve 42. The gate valve 38 is opened and water flows from the supply line to the nozzles so as to thoroughly mix the ash and water. The gate valve 39 is then opened and the ash and water flow through the opening 18, the jets 30 and 31 aiding in the removal by agitating and forcing the ash and water toward the discharge opening. The jet 32 and ejector 40 force the ash through the pipe 27 and to a suitable point of discharge.

After a discharge or emptying period, the valve 39 is closed and the water issuing from the nozzles refills the pit. When this occurs, the valve 38 is closed. The valve 42 is closed after the closing of valve 39.

By reason of the coaction of the jets and the inclined surfaces 28 and 29 any particles of ash not readily entering the discharge opening 18 will be forced past the opening and upwardly along such surfaces and will fall backwardly into the path of the jets. This will continue until such particles pass through the opening. It will be readily seen, therefore, that my improved structure precludes the formation of arches and provides for the effective removal of the ash and water from the pit.

It may be noted at this point that insofar as certain aspects of the present invention are concerned, it is not necessary that the jets 30 and 31 be disposed in the manner shown, for the function of forcing the ash and water toward the opening and along the surfaces 28 and 29 might equally as well be performed by other arrangements, for example, the jets may be disposed within the end wall 16 and directed toward the opposite end wall 15. The back flow of water will then carry the ash toward the opening. This latter operation is well known in placer mining and will be readily understood by those skilled in the art.

It is to be further noted that insofar as certain aspects of the invention are concerned, its use is not limited to water-filled ash pits. Furthermore, the particular features of construction of the bottom wall are not necessary to the broader applications of the present invention, they having been covered in my copending application, Serial No. 560,199 filed August 29, 1931, and assigned to the Westinghouse Electric and Manufacturing Company.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In ash disposal apparatus, the combination of a pit for receiving and storing ash and comprising side walls, end walls and a bottom wall having a discharge opening therein adjacent one of the end walls, that portion of the bottom wall between said one end wall and the opening being inclined upwardly and toward said end wall, and means providing for the movement of ash along the bottom wall and towards the discharge opening.

2. In ash disposal apparatus, the combination of a pit for receiving and storing ash and comprising side walls, end walls and a bottom wall having a discharge opening therein adjacent one of the end walls, that portion of the bottom wall extending between the opening and said one end wall and between the opening and the adjacent portions of the side walls being inclined upwardly and toward the end wall and the adjacent portions of the side walls, and means providing for the movement of ash along the bottom wall and towards the discharge opening.

3. In ash disposal apparatus, the combination of a pit for receiving and storing ash and comprising side walls, end walls and a bottom wall having a discharge opening therein adjacent one of the end walls, that portion of the bottom wall between said one end wall and the opening being inclined upwardly and toward said end wall, and fluid jet means for forcing the ash along the bottom wall and toward the discharge opening.

4. In ash disposal apparatus, the combination of a pit for receiving and storing ash and comprising side walls, end walls and a bottom wall having a discharge opening therein adjacent one of the end walls, that portion of the bottom wall extending between the opening and said one end wall and between the opening and the adjacent portions of the side walls being inclined upwardly and toward the end wall and the adjacent portions of the side walls, and fluid jet means for forcing the ash along the bottom wall and toward the discharge opening.

5. In ash disposal apparatus, the combination of a pit for receiving and storing ash and comprising longitudinally-extending side and bottom walls and transversely-extending end walls, that portion of the bottom wall which lies adjacent to one of the end walls being curved upwardly and towards said one end wall and the adjacent portions of the adjoining side walls and having a discharge opening formed in the lower and central regions thereof, and means providing for the movement of ash along the bottom wall and towards the discharge opening.

6. In ash disposal apparatus, the combination of a pit for receiving and storing ash and comprising longitudinally-extending end walls, the portion of the bottom wall lying adjacent one of the end walls being curved upwardly and towards said one end wall and the adjacent portions of the adjoining side walls and having a discharge opening formed in the lower and central regions thereof, and fluid jet means for forcing ash along the bottom wall and towards the discharge opening.

7. In ash disposal apparatus, the combination of a pit for receiving and storing ash and comprising side walls, end walls and a bottom wall having a discharge opening therein adjacent one of the end walls, that portion of the bottom wall between said one end wall and the opening being inclined upwardly and toward said end wall, and fluid jets arranged to discharge fluid under relatively high pressure along the bottom wall and in the direction of the discharge opening.

8. In ash disposal apparatus, the combination of a pit for receiving and storing ash and comprising side walls, end walls and a bottom wall having a discharge opening therein adjacent one of the end walls, that portion of the bottom wall between said one end wall and the opening being inclined upwardly and toward said end wall, and fluid jets disposed in the bottom wall and arranged to direct fluid under high pressures along the bottom wall and in the direction of the discharge opening.

In testimony whereof, I have hereunto subscribed my name this 5th day of Nov. 1931.

ROBERT A. FORESMAN.