Aug. 18, 1931. F. B. ALLEN 1,818,967

APPARATUS FOR HANDLING SOLIDS

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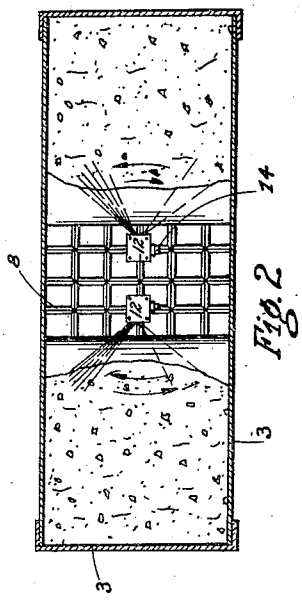


Fig. 2

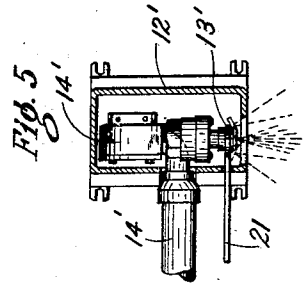


Fig. 5

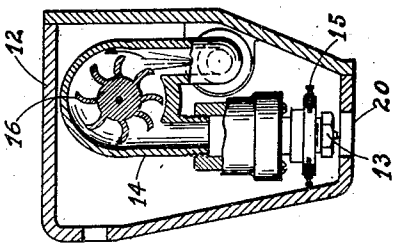


Fig. 4

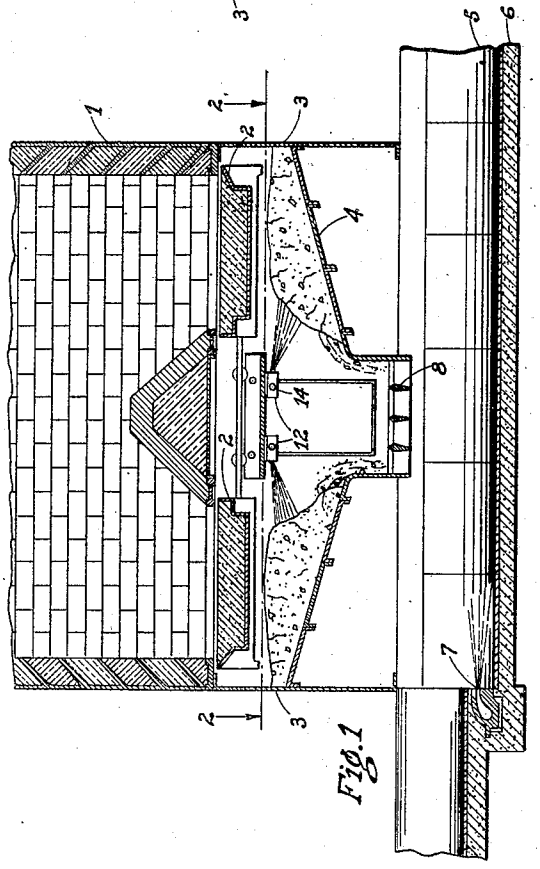


Fig. 1

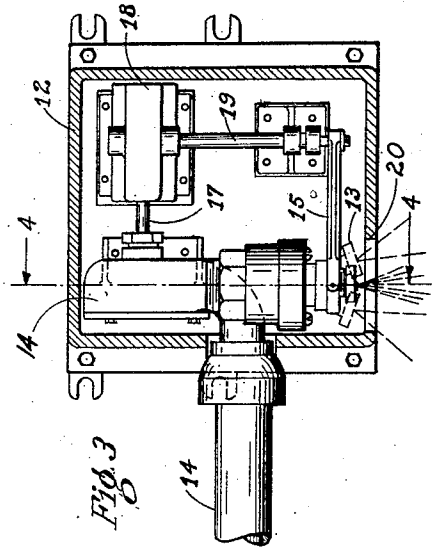


Fig. 3

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Fig. 6

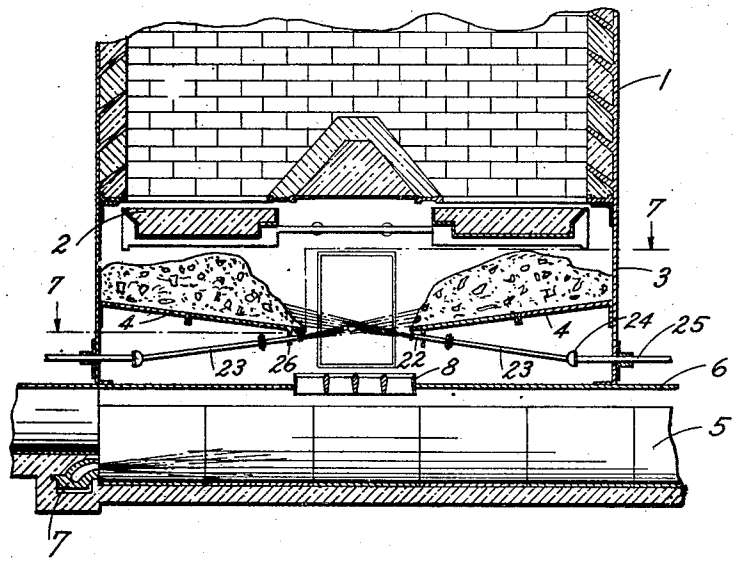
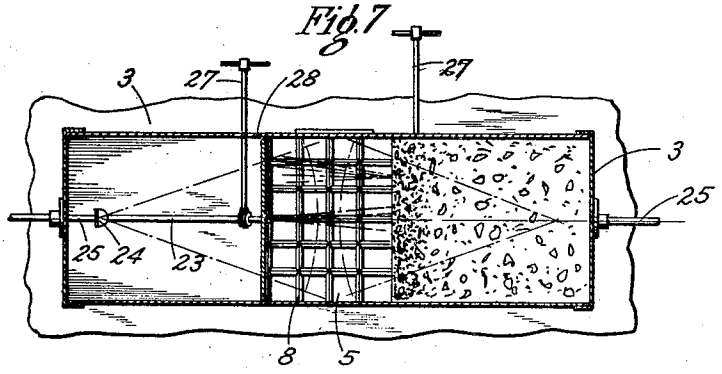


Fig. 7



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UNITED STATES PATENT OFFICE

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APPARATUS FOR HANDLING SOLIDS

Application filed April 15, 1929. Serial No. 355,164.

This invention relates to an improved method of and apparatus for the handling of solids. More particularly it relates to a new and improved method of and apparatus for transferring solid materials from a hopper to a sluiceway.

It has been customary in removing combustion residues from a furnace to drop the same from the furnace upon an inclined wall or feed plate suitably disposed in a chamber to receive and support the residues and then periodically to flush the residues from the feed plate into a conduit which conducts the mixture of liquid and residues away. In the operation of the customarily used flushing devices the liquid often tends to bank up behind a body of the residue upon the feed plate until a sufficient body of liquid has accumulated to flush a mass of the residue therefrom at one time.

It is an object of this invention to provide a method of and a device for handling solids in successive small amounts and removing the same from an inclined supporting means.

It is a further object to provide a method of and means for washing solids successively from substantially the entire width of a feed plate.

Another object is to provide an improved self-contained liquid directing device.

Other objects will be apparent from the specification and from the accompanying drawings in which latter;

Fig. 1 is a longitudinal section of the improved furnace bottom and residue disposal means.

Fig. 2 is a section taken along the line 2—2 of Fig. 1;

Fig. 3 is a plan view of the improved flushing device with the casing broken away;

Fig. 4 is a transverse section taken along the line 4—4 of Fig. 3.

Fig. 5 is a plan view of a modification of the flushing device with the casing therefor broken away.

Fig. 6 is a longitudinal section of a furnace bottom showing a modified form and arrangement of the flushing device.

Fig. 7 is a section taken along the line 7—7 of Fig. 6.

Referring particularly to Figs. 1 to 4 inclusive of the drawings, in its preferred embodiment the device comprises a furnace hopper 1 provided with a plurality of discharge openings closed by the movable doors 2. Walls 3 and feed plates or inclined walls 4 form a chamber beneath the discharge openings adapted to receive and support incombustible residues discharged through the openings. The feed plates 4 are inclined downwardly toward their adjoining ends and terminate in spaced relation to each other to permit the incombustible residues to be passed therefrom into a conduit 5 which can be carried in the floor 6 of the boiler house. Means 7 are provided for flushing the incombustible residues through the conduit. A grate 8 prevents the entrance of residues into the conduit of too large a size to be flushed through the conduit.

The incombustible residues dropped upon each feed plate are washed therefrom by a stream of water or other liquid played thereon by a flusher carried by the furnace hopper. Each flusher is enclosed in a casing 12. It comprises a nozzle 13 which is flexibly connected by a ball and socket joint or otherwise with a source of liquid supply 14. The nozzle is oscillated laterally with respect to the feed plate by power derived from the flow of water through the conduit 14 in the following manner. The nozzle has pivotal connection with the cam lever 15, which is reciprocated through power derived from a water wheel 16 disposed in the conduit 14 which actuates drive shaft 17, worm reduction unit 18, and cam shaft 19. An opening 20 in the casing 12 permits the water to issue from the nozzle and impinge with considerable force and progressively against a side of the pile

of solids on the feed plate and in a direction opposed to the direction of movement of the solids on the plate.

In the modification illustrated in Fig. 5 the flusher is so constructed that movement of the nozzle can be effected manually. As shown the nozzle 13′ is flexibly connected by a ball and socket joint or otherwise with the water conduit 14′. A lever 21 is connected to the nozzle and projects through the wall of the case 12′. The lever can be actuated manually or by any suitable means to effect change of direction of the nozzle to direct the stream of liquid progressively against the face of the pile of ash upon the opposed feed plates.

In the operation of the device the doors 2 are opened permitting incombustible residues in the furnace hopper to be dropped upon the feed plates. Water or other fluid under pressure is turned into the conduits 14 and issues from the nozzle 13 and at the same time causes oscillation of the nozzle. The water is directed from the nozzle against the incombustible residues on the feed plate in a direction opposed to the direction of movement of the solids on the feed plate and is played across substantially the entire width of the feed plates and exposed face of the solids on the plate. The incombustible residues are thus washed steadily in small portions from the feed plates into the conduit 5.

Referring to the modification of the invention illustrated in Figs. 6 and 7, the disposal system for incombustible residues of a furnace is shown with a modified form of flusher. In this embodiment a nozzle 22 is disposed below the discharge end of each feed plate 4 in spaced relation thereto and liquid from the nozzle under one plate washes the residues from the opposite plate. The nozzles are inclined upwardly at substantially the same inclination as that of the feed plates 4. The nozzle has fluid communication with pipe 23 which in turn is connected at 24 with feed pipe 25 for pivotal movement with respect thereto. A guide 26 extends transversely across the sluiceway 5 and forms a bearing and guideway for the pipe 23 in its pivotal movement. Oscillation of each nozzle 22 laterally of the feed plate 4 is preferably effected manually by means of a handle 27 which is connected to the pipe 23 and extends through an opening 28 in the wall 3.

The liquid from a nozzle 22 is directed more or less parallel to a top surface of the feed plate 4 and contacts with the face of the ash pile exposed or opposed to the discharge edge of the feed plate 4, the contact being progressive along the lower edge of the said opposed face.

In the devices illustrated there has been shown a flusher for each feed plate. It will be understood that a single flusher can be utilized for each pair of feed plates. By the constructions described it is possible to apply a stream of liquid successively to the front side of the entire pile of ashes upon the feed plate and by this progressive application the solids are removed in small portions and delivered to the sluiceway. The relatively large sized pieces are struck by water at various angles and on several sides and are caused to tip and tilt about and to be washed down the feed plate. The quantity of water necessary to accomplish this result is reduced to a minimum. The use of a single jet permits of a highly concentrated application of the power in the water thus increasing the efficiency of the ash disposal system.

While the invention has been described as applied to the removal of furnace residues from a furnace bottom it will be understood that the principles thereof can be applied to the removal of particles of other solid material such as sand or the like. Also the solid material can be removed from any receptacles to a place of disposal by utilizing the invention above described.

While particular embodiments of the invention have been shown and described it will be understood that modifications can be made therein within the spirit and scope of the invention and such modifications are intended to be covered by the appended claims.

What is claimed is:—

1. Apparatus for handling loose solids comprising a receptacle having a discharge opening, an inclined feed plate disposed below said opening and adapted to retain solids discharged through said opening, a nozzle, means for supporting said nozzle whereby said nozzle is directed to throw a stream of liquid against the solids retained on said plate, connections between said nozzle and a source of supply of liquid under pressure, a water-wheel in said connections adapted to be turned by flow of liquid under pressure therethrough, and means, actuated by rotation of said water-wheel, for oscillating said nozzle whereby the stream of liquid from said nozzle is directed back and forth over the solid material on said feed plate.

2. Apparatus for handling loose solids comprising a receptacle having a pair of spaced discharge openings, a pair of oppositely inclined surfaces below said openings and adapted to retain solids discharged through said openings, a pair of nozzles secured at the lower edges of said inclined surfaces, each of said nozzles being adapted to direct a stream of liquid against material on the opposite inclined surface, and means for oscillating said nozzles to direct their streams of liquid against various parts of the material retained on said surfaces.

3. Apparatus for handling loose solids comprising a receptacle having a discharge opening, an inclined feed plate disposed below said opening and adapted to retain solids

discharged through said opening, a nozzle, means for supporting said nozzle at a point removed from said feed plate whereby said nozzle is adapted to direct a stream of liquid against material retained on said feed plate and means for oscillating said nozzle to direct its stream of liquid against various parts of the material retained on said feed plate.

In testimony whereof I hereunto affix my signature this 21st day of March, 1929.

FRANK B. ALLEN.