April 2, 1929. F. B. ALLEN 1,707,343

APPARATUS FOR HANDLING SOLID MATERIAL

Filed Oct. 7, 1927 2 Sheets-Sheet 1

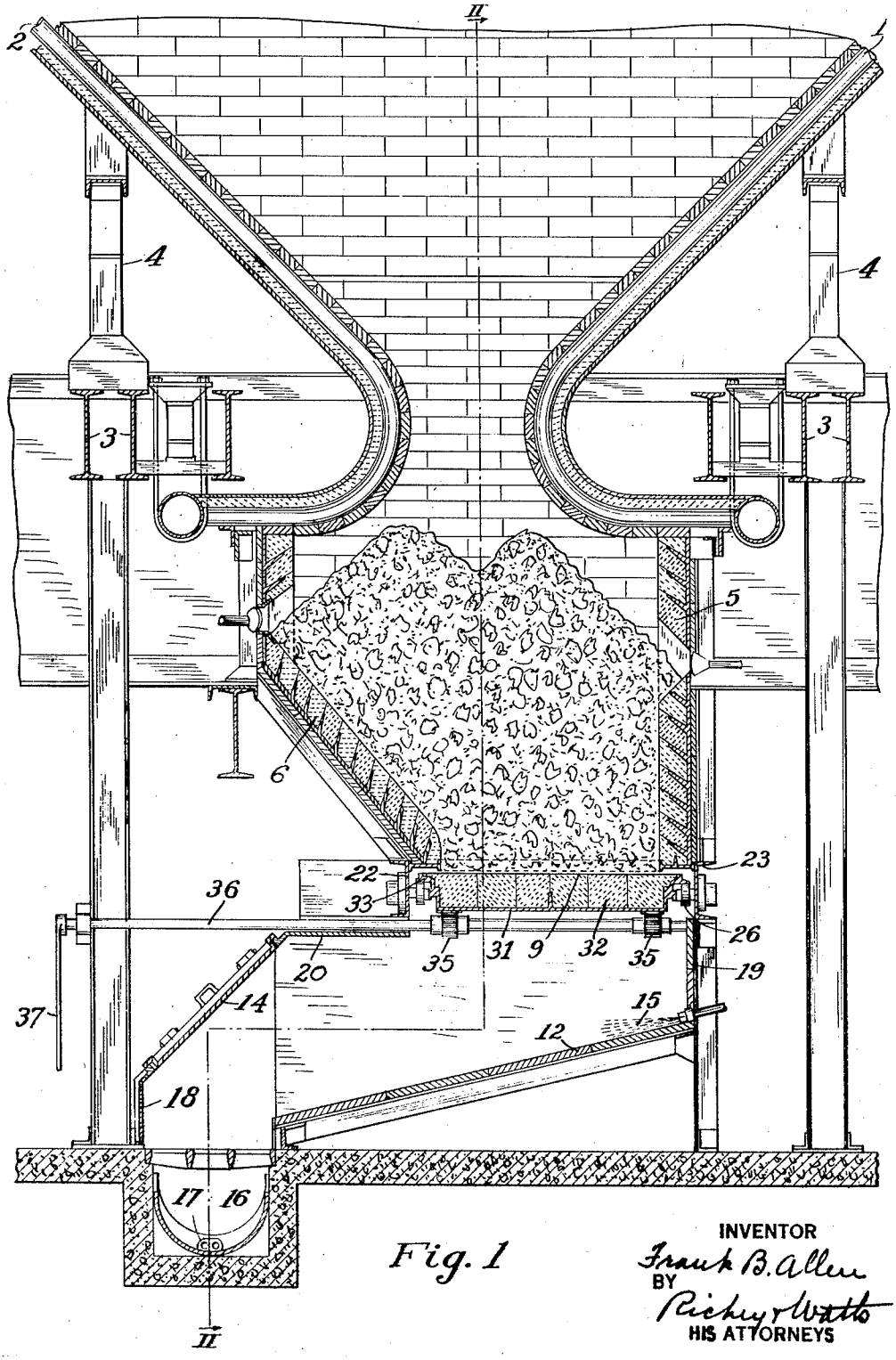


Fig. 1

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Frank B. Allen
BY
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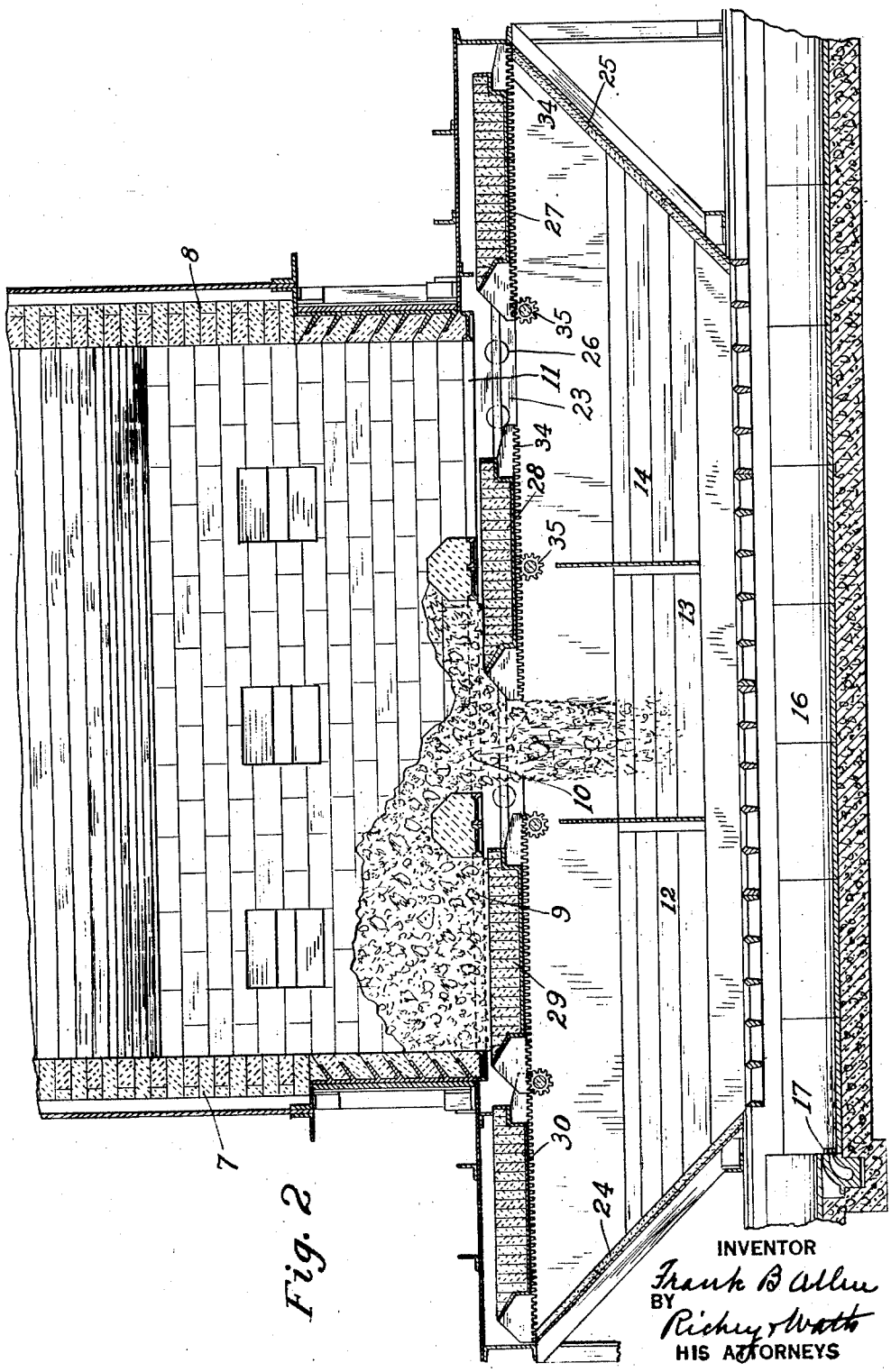


Fig. 2

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Patented Apr. 2, 1929. 1,707,343

UNITED STATES PATENT OFFICE.

FRANK B. ALLEN, OF LOWER MARION TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE ALLEN-SHERMAN-HOFF COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

APPARATUS FOR HANDLING SOLID MATERIAL.

Application filed October 7, 1927. Serial No. 224,558.

This invention relates to apparatus for handling solid material and is particularly applicable to the removal of ashes and slag from under boiler furnace and the like.

One object of the present invention is to provide means for discharging solid material from hoppers, bins, and the like, by which the discharge may be effected with the expenditure of very little energy.

Other objects will hereinafter appear.

The invention itself will be better understood from the description of one practical embodiment thereof, illustrated in the accompanying drawings, in which;

Figure 1 is a transverse sectional view of an ash hopper and ash conveying means of a boiler furnace, and

Figure 2 is a longitudinal sectional view taken on the line II—II of Figure 1.

In Figure 1 the bottom of the furnace is shown as consisting of downwardly converging water walls 1 and 2 supported on floor beams 3 and pillars 4, from which furnace bottom the ashes drop into an ash receiving and collecting hopper having side walls 5 and 6 and end walls 7 and 8, its bottom being provided with three discharge openings 9, 10, and 11, provided with moveable closure to be hereinafter described.

Beneath the discharge openings 9, 10, and 11 are inclined feed plates, 12, 13, and 14, respectively, along which the ashes may be conveyed by jets 15 of water or the like to a conveying sluiceway 16, along which sluiceway they may be propelled by jets of water delivered through nozzles 17.

A transferring chamber is formed by the sluiceway, feed plates, discharged openings vertical walls 18 and 19, horizontal wall 20 and an inclined wall joining walls 18 and 20 and provided with access doors 21. The space between this chamber and the bottom of the ash hopper is closed by beams 22 and 23 which support the bottom of the ash hopper, and the ends of the chamber are closed by walls 24 and 25, inclined so that, while the bottom of the chamber is substantially the same shape and size as the bottom of the ash hopper, the top extends beyond the ends of the hopper a distance at each end greater than the length of one discharge opening.

Upon the inner surfaces of beams 22 and 23 are journalled a plurality of rollers 26 upon which the discharged doors are adapted to slide.

As shown in Figure 2, the number of doors is one greater than the number of discharge openings, being in the example shown, four doors 27, 28, 29 and 30 for three openings, each door comprising a metal frame 31 and a refractory lining 32, and being provided on its side edges with outwardly extending flanges 33 which rest upon the rollers 26. The bottoms of these doors are provided with racks 34, engaged by pinions 35 carried on shafts 36 which extend to the exterior of the chamber and may be rotated by handles 37.

The operation of the device is as follows:

Starting with the discharge openings closed and door 27 below the opening 11, door 28 below opening 10, door 29 below opening 9, and door 30 in the extreme left hand corner of the transferring chamber, the operator turns the handle 37 positioned to the extreme left as seen in Figure 1, and by so doing moves door 27 to the position shown in Figure 2, thus opening discharge opening 11 and allowing the ashes to drop therethrough upon feed plate 14. He next operates the second handle 37 and by so doing moves door 28 from beneath opening 10 to beneath opening 11, the ashes above opening 10 falling therethrough upon the feed plate 13. He then operates the next handle 37, and moves door 29 from beneath opening 9 to beneath opening 10, allowing the ashes above opening 9 to drop upon feed plate 12. He next operates the last handle 37, and moves door 30 to close opening 9. In this operation he has discharged ashes above each of the discharge openings and in so doing has expended only sufficient energy to move four doors slightly further than their lengths, while with prior types of doors he would have had to move each door to its open position and then return it to closed position, making a total, for three discharge openings, of six operations each requiring him to move a door for at least its own length. From this it will be seen that the energy required in discharging the ashes from the hopper is greatly reduced, in the example described the operator would need to expend 50% more energy to operate doors of prior types over that required in the application of the present invention.

While the precise details of the embodiment herein illustrated has been described in some detail, obviously many variations and modifications may readily be made without departing from the spirit of the invention, and I do not therefore limit myself to precise details disclosed but claim as my invention all the embodiments coming within the scope of the subjoined claims.

I claim:

1. A hopper bearing a plurality of alined discharge openings, a plurality of closures for said openings the number of closures being one more than the number of openings, means for moving a closure from beneath one end opening, means for successively moving each succeeding closure from beneath one opening to beneath the next adjacent opening, and means for moving the last closure to close the last opening.

2. A hopper having a plurality of alined discharge openings, a series of translatable closures therefor moveable along the common center line of the discharge openings, the number of closures of the series being one more than the number of the openings, and a plurality of means each capable of moving a closure from beneath one discharge opening to beneath the adjacent discharge opening.

3. A hopper having a plurality of alined discharge openings, horizontally disposed guides extending in the direction of the common center line of said openings and at the sides thereof, a plurality of gates slidable on said guides, the number of gates being one greater than the number of openings, and a plurality of moving means one for each gate, each capable of moving the gate along the guide in either direction a distance of that between the centers of adjacent discharge openings.

4. The method of controlling the discharge of material from a receptacle having a plurality of discharge openings, which comprises, first removing a closure from one opening, then removing the closure from the adjacent opening and placing the same closure in position to close the first opening, repeating this operation until the last opening has been opened, and then closing the last opening with an additional closure.

In testimony whereof I hereunto affix my signature this 4th day of October, 1927.

FRANK B. ALLEN.