

Jan. 22, 1935.

J. S. BENNETT

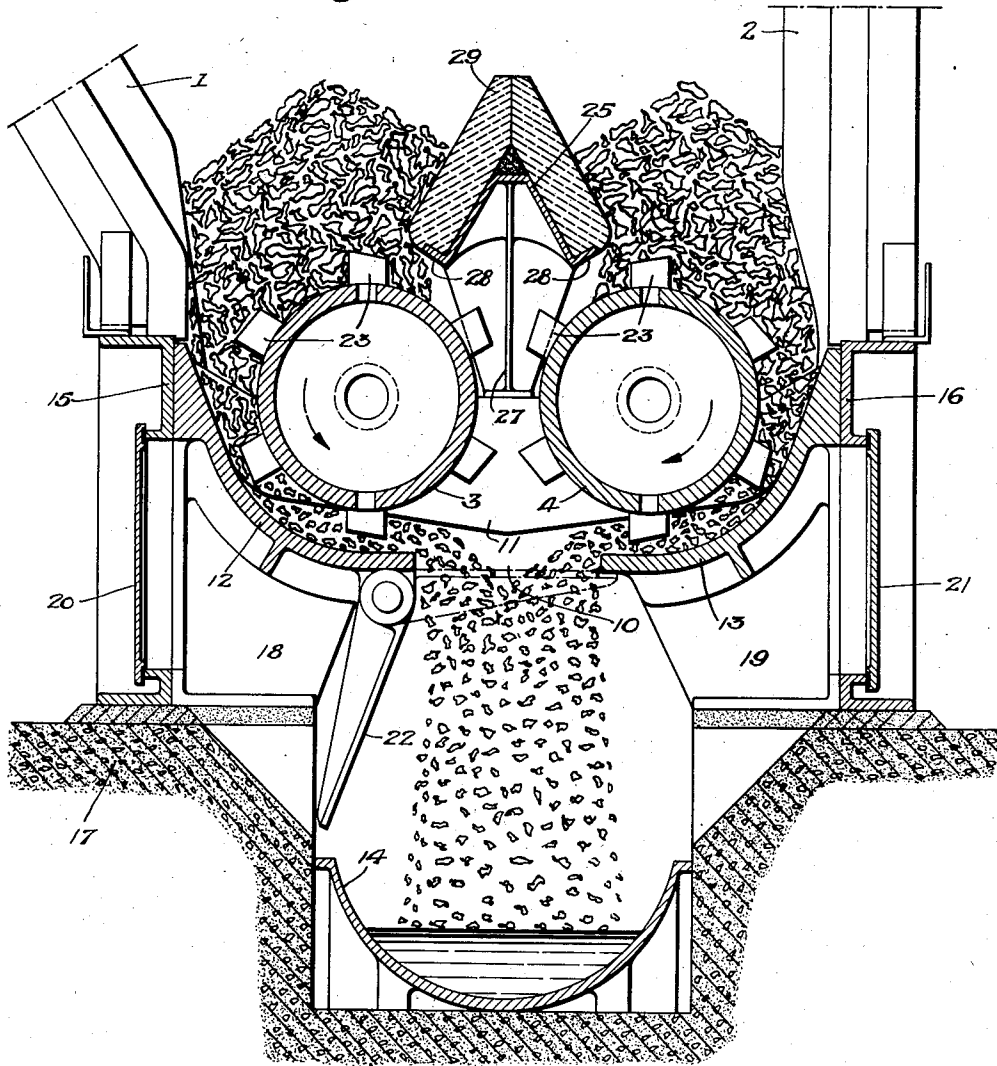
1,988,473

HOPPER

Filed Dec. 16, 1931

2 Sheets-Sheet 1

*Fig. 1.*



*Inventor:-  
Joseph S. Bennett,  
by his Attorneys,  
Hewson & Hewson*

Jan. 22, 1935.

J. S. BENNETT

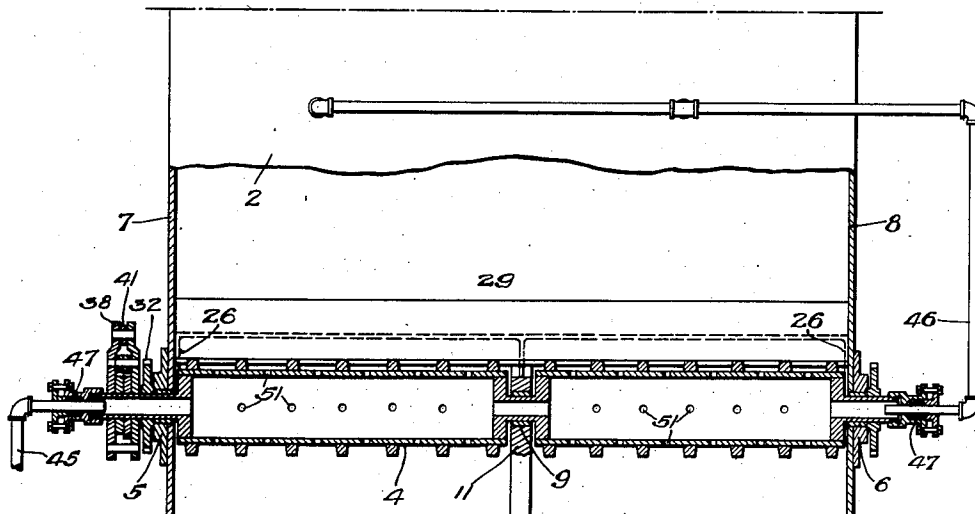
1,988,473

HOPPER

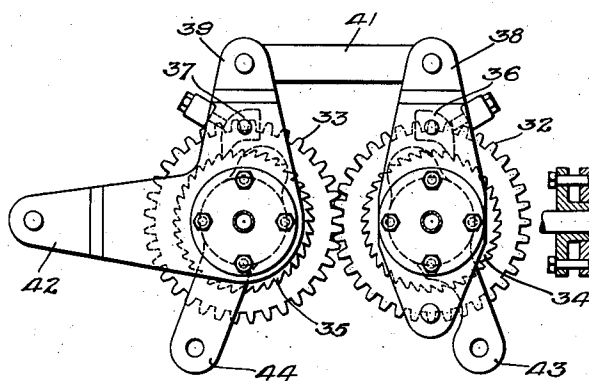
Filed Dec. 16, 1931

2 Sheets-Sheet 2

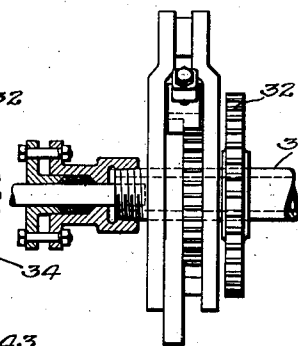
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



*Inventor -  
Joseph S. Bennett,  
by his Attorneys,  
Hawson & Hawson*

# UNITED STATES PATENT OFFICE

1,988,473

HOPPER

Joseph S. Bennett, Merion, Pa., assignor to American Engineering Company, Philadelphia, Pa., a corporation of Pennsylvania

Application December 16, 1931, Serial No. 581,436

2 Claims. (Cl. 110—165)

This invention relates to furnace ash disposal apparatus, and more particularly to such apparatus of a type employing a sluice or equivalent conveying means for conducting the ashes to a remote point of discharge.

One object of my invention is to provide novel and improved means for feeding the ashes to the sluice at a substantially uniform rate.

Another object of the invention is to provide an ash-receiving hopper having novel and improved means for discharging the ashes to a sluice or its equivalent.

Still another object of the invention is to provide a hopper of the stated character wherein the tendency of the ash to avalanche to the discharge is substantially eliminated and avoided.

A further object of the invention is to provide a hopper of novel construction incorporating highly efficient crushing and discharge means.

A still further object of the invention is to provide a novel assembly of hopper and sluice or other ash conveyer provided with novel means for closing the discharge opening of said hopper.

Still another object of the invention is to provide in an ash disposal system an assembly comprising a hopper and a sluice or equivalent conveying means wherein provision is made for observing the flow of ash from the hopper to the sluice.

Another object of the invention is to provide in an ash removal system a hopper having feeding and crushing rolls provided with novel cooling means.

A further object of the invention is to provide a hopper of the stated character wherein provision is made for utilizing the fluid-cooling means for the said rolls for spraying the ash content of the hopper.

The invention further resides in certain novel structural features and arrangements hereinafter set forth and illustrated in the attached drawings, in which:

Figure 1 is a transverse sectional view of a hopper and sluice assembly made in accordance with my invention;

Fig. 2 is a side elevation and partial sectional view of the assembly;

Fig. 3 is a fragmentary elevational view showing the roll-actuating mechanism, and

Fig. 4 is a side elevational and partial sectional view of the mechanism shown in Fig. 3.

With reference to the drawings, 1 and 2 are the lower portions of the side walls of a hopper, in the bottom of which is mounted for rotation longitudinally extending rolls 3 and 4. As shown

in Fig. 2, each of these rolls is supported in bearings 5 and 6 in the end walls 7 and 8 of the hopper and in an intermediate bearing 9 formed in a beam 11 extending transversely across the bottom of the hopper. As illustrated in Fig. 1, the bottom wall of the hopper is formed by a pair of curved plates 12 and 13 which extend inwardly of the hopper from the lower ends of the side walls 1 and 2, the curvature of these plates conforming more or less closely to the peripheral curvature of the rolls 3 and 4. The inner or lower edges of the plates 12 and 13 terminate in each instance short of the longitudinal center of the bottom of the hopper and form therebetween a longitudinally extending discharge opening 10, which in the present instance directly overlies a sluice 14. Plates 12 and 13 may be provided with grooves or teeth, if desired, to facilitate crushing clinkers and larger ash particles.

The plates 12 and 13 are secured to or form a part in the present instance of pedestal brackets 15 and 16 which support the walls of the hopper proper and which rest upon a suitable foundation 17. The foundation in the present instance is shown as of concrete, and the channel for the sluice 14 is formed within this foundation. Between the bottoms of the plates 12 and 13 and the bottoms of the brackets 15 and 16 are formed spaces 18 and 19 at each side of and below the discharge opening, access to which space is provided for by detachable closures 20 and 21 at the outer sides of the pedestal elements 15 and 16, respectively. By removal of these doors, inspection of the discharge from the hopper to the sluice 14 is possible. Pivotaly suspended from the lower end and bottom side of the plate 15 is a gate 22 which preferably is operative from the exterior of the hopper assembly to close the discharge opening 10, the closing position of the gate being illustrated in broken lines in Fig. 1. As illustrated, the rolls 3 and 4 are provided with radially projecting teeth 23 and the plates 12 and 13 are spaced from the surfaces of the rolls a sufficient distance to allow adequate clearance therefor.

Extending longitudinally of the hopper above the rolls and on a line intermediate the axes of the latter is a beam 25, this beam being supported at the ends upon brackets 26, 26, secured to the end walls 7 and 8 and intermediate its ends upon a bracket 27 supported on the transverse beam 11. The beam 25 has downwardly diverging sides terminating in upwardly and outwardly extending flanges 28, these flanges forming a sup-

port for refractory blocks 29 forming an inverted V-shaped deflector overlying the space between the rolls. The flanges 28 are spaced from the peripheral surfaces of the rolls only a sufficient distance to provide adequate clearance for the teeth 23.

The rolls 3 and 4 are actuated in the direction of the arrows, see Fig. 1, through suitable mechanism, such, for example, as illustrated in Figs. 3 and 4. The projecting end of each of the roll shafts 31 is provided with a spur gear 32 and 33, respectively, which intermesh and thereby operatively connect the two shafts. Each of the shafts also carries a ratchet wheel, 34 and 35 respectively, which coast with pawls 36 and 37 respectively mounted upon levers 38 and 39 loosely mounted upon the respective shafts. The levers 38 and 39 are connected by a link 41 and the lever 39 is provided with an arm 42 for connection thereof with suitable driving means whereby the said levers may be oscillated. The pawls 36 and 37 operate in opposite directions, and since the movement of each roll is imparted to the other through the gears 32 and 33, oscillation of the levers 38 and 39 results in a continuous movement of the rolls in the opposite directions indicated. In order to regulate the rate of rotation of the rolls, I provide in the present instance cam levers 43 and 44 having effective cam portions adjustable into the paths of the pawls 36 and 37 respectively, these cams functioning to elevate the pawls from the ratchet wheel at predetermined points in the stroke, depending on the adjustments of the said levers 43 and 44. The levers 43 and 44 are mounted on the respective shafts and are adjustable thereon.

As illustrated, the rolls 3 and 4 are hollow, as also are the shafts at opposite ends of the rolls which project through the end walls of the hopper. Pipes 45 and 46 extend into the outer ends of the shafts of each of the rolls and suitable packing boxes 47 are carried by each shaft through which the said pipes 45 and 46 extend and which seal the joints between the said pipes and the hollow roll shafts. The pipes 46 extend upwardly to opposite sides of the hopper and communicate through the side walls 1 and 2 with suitable nozzles at the inner faces of said walls. The pipes 45 are connected to a suitable source of fluid supply whereby water or other fluid may be passed into and through the rolls 3 and 4 and

through the pipes 46 to the said nozzles. Preferably the rolls 3 and 4 are provided with ports 51 through which a portion of the fluid may pass into the lower portion of the hopper. The fluid circulating system described above including as a part thereof the rolls 3 and 4 constitutes a highly satisfactory method of cooling the rolls and for injecting water or other liquid into the interior of the hopper.

In this apparatus, the rolls 3 and 4 constitute feeding means for the ash content of the hopper to the discharge port 10 and to the sluice 14; and by cooperation with the plates 12 and 13 function also as crushing means for the ash preventing passage of large clinkers and ash particles to the sluice. The entire ash content of the hopper is deflected by the deflector 29 to the outer sides of the rolls 3 and 4, and movement of the ash to the discharge opening 10 is directly controlled by the rotary movement of the rolls as described. Avalanching of the fuel to the discharge opening of the hopper is prevented, and the construction provides for a regulated and substantially uniform discharge of ashes from the hopper to the sluice. The construction is particularly desirable where a sluice or other conveying means is used for removing the ashes discharged from the hopper, since efficient operation of this character of device is largely dependent upon a uniform feeding of the ash or other material thereto and upon a substantially uniform consistency in the material discharged.

I claim:

1. A hopper comprising a discharge opening, and a roll for controlling passage of the contents of the hopper to said opening, said roll being hollow, nozzles in the inner side of the walls of said hopper, means for passing a fluid cooling medium into one end of said roll, and a duct extending from the opposite end of said roll to said nozzles.

2. A hopper comprising a discharge opening, and a roll for controlling passage of the contents of the hopper to said opening, said roll being hollow, nozzles in the inner side of the walls of said hopper, means for passing a fluid cooling medium into one end of said roll, a duct extending from the opposite end of said roll to said nozzles, and ports in said roll permitting discharge of a portion of said cooling medium into the bottom of the hopper.

JOSEPH S. BENNETT.