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PATENTED AUG. 2, 1904.

W. F. WOLFE.
PULVERULENT COAL FEEDING APPARATUS.

APPLICATION FILED MAR. 15, 1902.

NO MODEL.

Fig. 3:

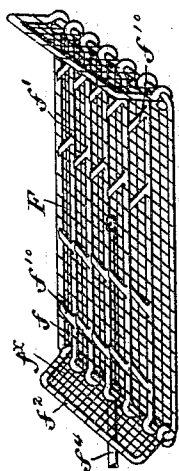


Fig. 2:

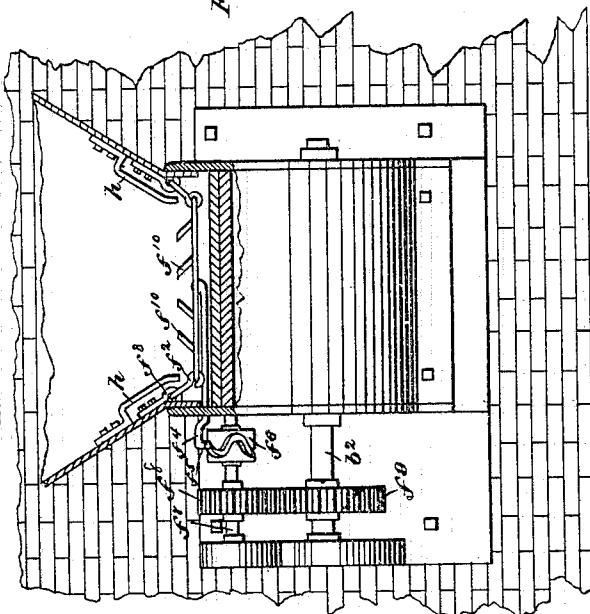
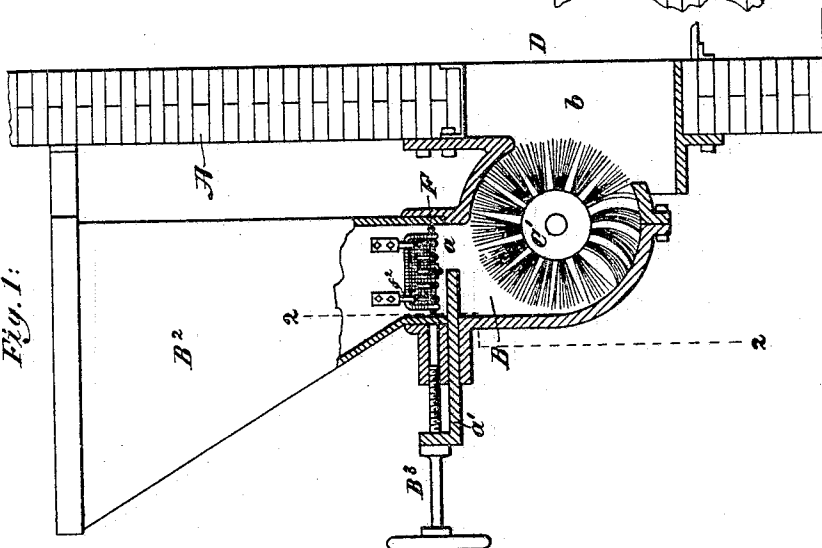


Fig. 1:



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UNITED STATES PATENT OFFICE.

WILTSIE F. WOLFE, OF NEW YORK, N. Y., ASSIGNOR TO PETER B. BRADLEY, OF BOSTON, MASSACHUSETTS.

PULVERULENT-COAL-FEEDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 766,407, dated August 2, 1904.

Application filed March 15, 1902. Serial No. 98,284. (No model.)

To all whom it may concern:

Be it known that I, WILTSIE F. WOLFE, a citizen of the United States, residing at New York, in the county and State of New York, have invented an Improvement in Pulverulent-Coal-Feeding Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to apparatus for feeding pulverulent or dust fuel to furnaces, particularly to furnaces employed for heating steam-generators and the like. In apparatus of this class the pulverulent or dust fuel is ordinarily fed into or deposited in a suitable receptacle or hopper, from the bottom of which it is drawn in required quantity and delivered to the devices which project the same into the combustion-chamber, and much difficulty has heretofore been experienced in obtaining a uniform flow of the pulverulent fuel from this hopper, because of frequently damp condition of the fuel, which renders it liable to cake and arch in the hopper, which of course obstructs the flow.

My invention relates particularly to means for removing or delivering the fuel from the hopper to the devices which project it into the combustion-chamber, and the various features comprising my invention will be fully herein-after described, in connection with the accompanying drawings, and specifically pointed out in the claims.

In the drawings, Figure 1 in side elevation, partial section, illustrates a pulverulent-fuel-feeding apparatus illustrating one embodiment of my invention; Fig. 2, a vertical sectional detail on the dotted line 2-2, Fig. 1; and Fig. 3, a perspective detail, on an enlarged scale, illustrating the foraminous hopper-bottom employed in Figs. 1 and 2.

In the embodiment of my invention selected for illustration herein and shown in the drawings the boiler-setting A, provided with the fuel-induction opening or door *b*, the combustion-chamber at D, the hopper B³ for the pulverulent or dust fuel, the delivery-chamber B, containing the rotary delivering device C', the

controlled passage-way *a* between the hopper and the delivery-chamber B, with its controlling gate or device *a'* and controlling-wheel shaft B³, are and may be of usual or desired construction—such, for instance, as shown in Reissue Letters Patent to F. N. Spear, No. 11,964, dated January 28, 1902, wherein like letters represent like parts. It should be understood, however, that while I have illustrated these parts in correspondence with parts of the said Spear apparatus as a matter of convenience, yet my invention is not restricted thereto.

In accordance with one feature of my invention I arrange at the bottom of the hopper and preferably immediately above the controlling gate or device *a'* a movable foraminous bottom F. This foraminous bottom may be of suitable or desired construction. I have found it convenient to construct it as illustrated in Fig. 3, wherein it is shown as composed of a rectangular frame *f* of substantially the same width as the bottom of the hopper and slightly shorter in length than said bottom to permit of a vibration thereof in said hopper, the said frame having its ends connected by longitudinal members *f'* to give rigidity to the structure, the whole being covered with a foraminous plate or netting *f''*. This bottom is provided with suitable means for vibrating or reciprocating it to cause the fuel resting upon it to sift down through to the delivery device C'. As herein shown, the said foraminous bottom is suspended at its ends upon swinging links *f''*, pivotally attached to the sides of the hopper, as at *f'''*, Fig. 2. A connecting-rod *f''*, jointed to the foraminous bottom *f*, is extended laterally through the inclosing case of the apparatus and is provided at its end with a roller or other stud *f''*, shown as engaging the groove of the barrel-cam *f''*, fast on a cam-shaft *f''*, geared in suitable manner, as by the wheels *f''* *f''*, to the shaft *b'* of the delivery device C', whereby rotation of the latter by suitable means (not shown) will cause corresponding and proportionate rotation of the cam *f''* and vibration or reciprocation of said foraminous bottom.

For the purpose of additionally loosening the fuel in the hopper immediately above the said bottom I have provided the frame members f' thereof with upwardly-extended and preferably-inclined spurs f'' , which as the bottom reciprocates penetrate and loosen the fuel, causing it to fall upon the bottom. In fact, the inclined arrangement of the said spurs enables them to operate as positive feeding devices to force the fuel down upon the said bottom. By suspending the said bottom in swinging links, as shown, the bottom not only has a horizontal reciprocatory or vibratory movement, but it also has an appreciable up-and-down movement, owing to the short radius of the suspending links. This enables the bottom to exert at each reciprocation an up-and-down or hammer movement upon the mass of fuel above it, tending to loosen it and preventing its arching or caking. This is also true of any fuel that may pass down and tend to arch below the bottom and above the regulating device d' .

By employing a reciprocating foraminous bottom the fuel is not only compelled to pass to the delivery device in a finely-divided state, but the pulverization immediately above the foraminous bottom is induced by the relative movement between the bottom and the superimposed mass of fuel, as well as by the hammer movement upon the latter above referred to. There is consequently at each reciprocation of the hopper-bottom a deposition of finely-divided fuel evenly distributed over the rotary delivery device, which materially aids the latter in the delivery of the fuel to the combustion-chamber in the most efficient condition, which obviously is a dust or cloud-like state. Furthermore, this delivery is immediate and without opportunity for the subsequent agglomeration of the separated particles of fuel. The area of the deposit of fuel affected by the foraminous bottom may obviously be equal to the area of the latter, or may be suitably diminished by adjustment of the controlling-gate d' . On the other hand, the peculiar movements imparted to the bottom, whether with or without additional devices—such as the spurs f'' , referred to—effectually prevent arching or caking of the fuel, such as would prevent a continuous feed thereof to the delivery device. Shields h project inward from the ends of the hopper sufficiently to prevent the fuel sliding through to the delivery device past the ends of the reciprocating bottom.

My invention is not limited to the particular embodiment thereof here shown and described, as the same obviously may be varied within the spirit and scope of the invention.

Having described my invention, and without limiting myself in the matter of details, what I claim, and desire to secure by Letters Patent, is—

1. In a pulverulent-fuel-feed device, the com-

bination with suitable delivery means of a fuel-hopper therefor provided with a reciprocatory foraminous bottom and loosening-spurs inclined in both directions of movement of said bottom.

2. In a pulverulent-fuel-feed device the combination with delivery means of a pulverulent-fuel-supply hopper arranged above the same and communicating therewith, a bottom for said hopper adapted to reciprocate in a vertical and lateral direction, and loosening-spurs for said bottom.

3. In a pulverulent-fuel-feed device, the combination with delivery means of a fuel-supply hopper therefor, provided with a foraminous bottom mounted on short links to swing therein with a rising-and-falling movement, loosening-spurs for said bottom, and actuating means therefor.

4. In a pulverulent-fuel-feeding device, the combination of a hopper for holding a supply of pulverulent fuel, a delivery-chamber provided with mechanical delivery means for delivering the fuel directly therefrom into the combustion-chamber, a foraminous bottom for said hopper and interposed between the same and said delivery means, said bottom being mounted on short links to thereby swing with the rising-and-falling movement, and actuating means for said swinging foraminous bottom.

5. In a pulverulent-fuel-feeding device, the combination of a hopper for holding a supply of pulverulent fuel, a delivery-chamber provided with mechanical delivery means for delivering the fuel directly therefrom into the combustion-chamber, and a bottom for said hopper interposed between the same and said delivery means and adapted to reciprocate in a vertical and lateral direction.

6. In a pulverulent-fuel-feeding device, the combination of a hopper for holding a supply of pulverulent fuel and a delivery-chamber provided with mechanical delivery means for delivering the fuel directly therefrom into the combustion-chamber, said hopper being provided with a swinging foraminous bottom, having inclined spurs thereupon for feeding to said delivery means a distributed supply of pulverulent fuel.

7. In a pulverulent-fuel-feeding device, the combination of a hopper for holding a supply of pulverulent fuel, a delivery-chamber provided with mechanical delivery means for delivering the fuel directly therefrom into the combustion-chamber, said hopper being provided with a movable foraminous bottom to feed directly to said delivery means a distributed supply of pulverulent fuel, and controlling means to control the passage-way leading from said foraminous bottom to said delivery means.

8. In a pulverulent-fuel-feeding device the combination of a hopper for holding a supply of pulverulent fuel and a delivery-chamber

provided with mechanical delivery means for delivering the fuel directly therefrom into the combustion-chamber, said hopper being provided with a foraminous bottom mounted to swing therein and to feed directly to said mechanical delivery means a distributed supply of pulverulent fuel.

9. In a pulverulent-fuel-feeding device, the combination of a hopper for holding a supply of pulverulent fuel, a delivery-chamber provided with mechanical delivery means for delivering the fuel directly therefrom into the combustion-chamber, and one or more swinging devices in the bottom of said hopper and interposed between the fuel therein and said delivery means to control the feed of fuel therefrom to said delivery means and directly deliver thereto a distributed supply of pulverulent fuel.

10. In a pulverulent-fuel-feeding device the combination with a supply-hopper for holding a supply of pulverulent fuel, of a delivery-chamber provided with suitable mechanical delivery means for delivering fuel directly therefrom into the combustion-chamber, and transversely-reciprocating means in or adjacent the bottom of said hopper and interposed between the same and said delivery means for delivering during reciprocation directly to said mechanical delivery means a supply of pulverulent fuel.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILTSIE F. WOLFE.

Witnesses:

FREDERICK L. EMERY,
EVERETT S. EMERY.