

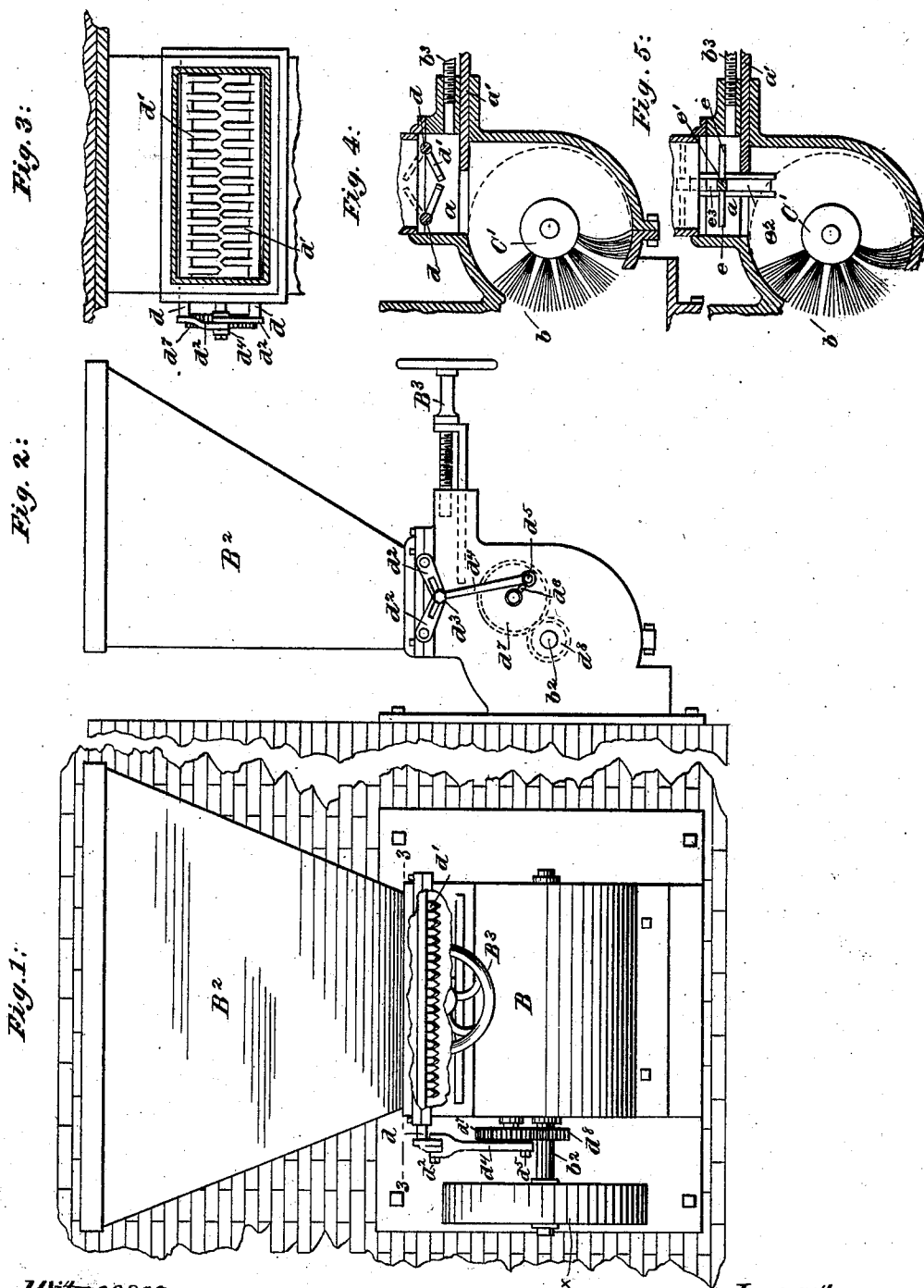
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W. F. WOLFE.
PULVERULENT FUEL FEED DEVICE.

APPLICATION FILED MAR. 15, 1902.

NO MODEL.



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UNITED STATES PATENT OFFICE.

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PULVERULENT-FUEL-FEED DEVICE.

SPECIFICATION forming part of Letters Patent No. 763,033, dated June 21, 1904.

Application filed March 15, 1902. Serial No. 98,283. (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-Fuel-Feed Devices, 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, such as coal, to the combustion-chambers of furnaces. Apparatus of this type usually comprise a hopper or receptacle for the pulverulent or dust coal or fuel, provided at its bottom with means for loosening and feeding the fuel therefrom, such fuel passing from the bottom of the hopper through a suitably-controlled passage or conduit into a delivery-chamber, where it is acted upon usually by a rotating delivery roll or device which projects the pulverulent fuel into the combustion-chamber of the furnace. In apparatus of this type much depends upon the certainty and uniformity with which the pulverulent fuel is delivered from the hopper to the delivery device, because any lumping or arching of the fuel by reason of dampness or otherwise obstructs the flow of fuel and interferes with the uniform delivery thereof into the combustion-chamber.

My present invention relates particularly to the means for loosening and feeding the pulverulent fuel from the bottom of the hopper to the delivery device, and the particular features of my invention will be hereinafter set forth in connection with one embodiment of the invention.

In the drawings accompanying this specification, Figure 1, in front elevation, illustrates an apparatus made in accordance with one form of my invention, a portion of the casing being broken away to expose the contained parts. Fig. 2 is an end elevation of Fig. 1. Fig. 3 is a sectional detail of the parts shown in Fig. 2, and Fig. 4 is a detail similar to Fig. 2 partially broken away to expose the loosening devices within, and Fig. 5 is a similar detail illustrating a modified form of apparatus.

Referring to the drawings, the hopper B^2 , the delivery-chamber B, with its contained delivery device C', arranged in front of the entrance-opening b to the combustion-chamber, the controlled passage-way a between the hopper and the delivery-chamber, with its controlling device or gate a' and its operating wheel or shaft B^3 , are and may be of suitable or desired construction—such, for instance, as illustrated in Reissue Letters Patent of the United States granted to Frank N. Spear under date of January 28, 1902, No. 11,964, to which reference may be had, although of course my invention is not restricted to use in connection with the features designated as similar to the Spear apparatus.

Referring particularly to Figs. 2, 3, and 4, the delivery-chamber casing B at its upper end closely adjacent the bottom of the hopper B^2 is shown as provided with two horizontally-arranged parallel shafts d , provided, respectively, with inwardly-extended pins or projections d' , the pins or projections of one shaft being preferably staggered relative to those of the other shaft in order that they may extend between the pins or projections of such other shaft, as best shown in Fig. 4.

The ends of the shafts d are projected endwise through one of the side walls of the delivery-chamber B and are provided outside the said wall (shown best in Figs. 2 and 3) with arms d^2 , slotted at their ends to receive a common pin d^3 in the forked end of the actuating-rod d^4 . This rod d^4 may be reciprocated or actuated in desired manner, I having found it convenient to attach the lower end of said rod by a clamping-bolt d^5 to a block (not shown) arranged to slide in the radial slot d^6 of the crank-wheel d^7 . This latter wheel is geared to and driven by a pinion d^8 , fast on the shaft b^2 of the delivery device of the apparatus.

Rotation of the delivery device, as by the pulley b^x , will thus also operate through the gearing described to rotate the crank-wheel d^7 and cause reciprocation of the actuating-rod d^4 and resultant rocking vibration of the shafts d . This causes the inwardly-extended pins or projections d' of such shafts to vibrate

vertically between and relative to each other to loosen the fuel in the bottom of the hopper and also to compel and control feed of the loosened fuel downward to and through the controlled passage *a* to the delivery device by which it is projected into the combustion-chamber.

In feeding pulverulent fuel to a furnace the best results require the injection of the fuel in a finely-divided condition, each fuel particle being surrounded by an atmosphere of oxygen preparatory to the rapid combustion which should immediately follow. This condition is difficult to obtain, however, where opportunity is given the fuel to collect in masses after its prior agitation and separation in the hopper or on its way from the supply-hopper to the combustion-chamber on account of the tendency of the fuel when so collected in masses to pack or agglomerate.

While my invention presents features of novelty not limited to the specific arrangement shown, it will be evident that the combination of the reciprocating loosening and feeding device with the rotary delivery device in the relation disclosed permits the efficient separation of the pulverulent fuel on its exit from the hopper and the immediate action thereupon by the rotary delivery device on its entrance into the delivery-chamber and its delivery thereby into the combustion-chamber in a finely-divided cloud without opportunity to accumulate and agglomerate. The rate of feeding may be regulated by regulating the rate or extent of movement of the agitating and feeding device and by varying the speed of the rotary delivery device, and this may be done without affecting the air-supply for the combustion-chamber, which latter may be regulated in any desired way.

The extent of vibration of the shafts *d* and their pins, which may be called "loosening" devices, is readily adjustable by adjusting the radial distance of the crank-pin *d*⁵ from the axis of its crank-wheel, and in any event the movements are such as to cause practical uniformity of loosening action and feed of the fuel.

I have here shown the actuating-rod *d*⁴ and its arms *d*² with connected devices at one of the ends only of the shafts *d*; but obviously the same or equivalent or other devices may be provided at both ends of said shafts, if found necessary.

In Fig. 5 I have shown a device differing somewhat from that of Fig. 1, yet having, as in Fig. 1, a substantially vertical reciprocatory motion. In the device Fig. 5 the pins or projections *e e* are carried by a horizontally-arranged bar *e'*, having vertically-extended guiding ends *e*² arranged to slide in the vertical guideways *e*³, formed in the side walls of the delivery-chamber casing. The bar *e'* may be reciprocated in suitable manner—such, for

instance, as the mechanism shown in Fig. 2—said device, however, having a vertical reciprocatory movement with both sets of pins or projections moving in unison.

My invention is not restricted to the particular forms thereof here shown and described, but may be otherwise varied without departing from 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 apparatus, the combination with suitable delivery means of a hopper therefor, provided with a plurality of rock-shafts in or adjacent the bottom thereof and staggered projections thereon, the projections of one shaft projecting between those of another shaft and means to rock said shafts and their projections.

2. In a pulverulent-fuel-feed apparatus the combination with suitable delivery means of a hopper therefor, provided with a plurality of loosening devices having staggered projections thereon in or adjacent the bottom of the hopper and means for causing reciprocation of said loosening devices.

3. In a pulverulent-fuel-feeding apparatus, the combination of a delivery-chamber, pulverulent-fuel-delivery means therein, a hopper for feeding pulverulent fuel to said delivery-chamber, a plurality of rock-shafts in the bottom of said hopper, loosening-fingers on adjacent sides of said shafts, and means for actuating the same.

4. In a pulverulent-fuel-feeding apparatus the combination of a delivery-chamber, pulverulent-fuel-delivery means therein, a hopper for feeding pulverulent fuel to said delivery-chamber, a rock-shaft in the bottom of said hopper, a plurality of loosening-fingers on said rock-shaft, and means for actuating said rock-shaft.

5. In a pulverulent-fuel-feeding apparatus the combination of a delivery-chamber, pulverulent-fuel-delivery means therein, a hopper for feeding pulverulent fuel to said delivery-chamber, a plurality of vertically-reciprocating loosening devices in or adjacent the bottom of said hopper, actuating means therefor, and means for varying the extent of reciprocation.

6. A pulverulent-fuel-feeding apparatus for feeding pulverulent fuel to a combustion-chamber, comprising a fuel-supply hopper, a delivery-chamber, a rotary delivery device therein arranged to deliver fuel therefrom directly into the combustion-chamber, a reciprocatory loosening and feeding device in or adjacent the bottom of said hopper and above said rotary delivery device whereby the commutated fuel is delivered directly to said rotary delivery device from said hopper and thereby to the combustion-chamber.

7. In a pulverulent-fuel-feeding apparatus the combination of a fuel-supply hopper, a delivery-chamber connecting therewith, a combustion-chamber into which said delivery-chamber opens, a rotary fuel-delivery device within said delivery-chamber and located beneath said hopper and a reciprocating loosening device in or adjacent the bottom of said hopper to loosen the fuel therein to permit its
5 passage to the delivery device and its injection
10

thereby directly into the combustion-chamber.

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,
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