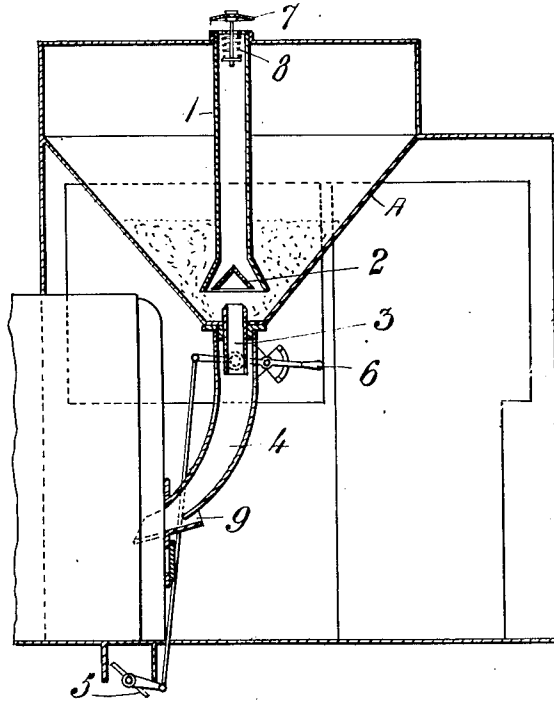


K. H. V. VON PORAT.
FEEDING DEVICE FOR PULVERULENT FUEL.
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1,364,533.

Patented Jan. 4, 1921.



Inventor:-
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by attorney
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UNITED STATES PATENT OFFICE.

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FEEDING DEVICE FOR PULVERULENT FUEL.

1,364,533.

Specification of Letters Patent.

Patented Jan. 4, 1921.

Original application filed May 4, 1916, Serial No. 95,387. Divided and this application filed December 27, 1918. Serial No. 268,550.

To all whom it may concern:

Be it known that I, KARL HJALMAR VILHELM VON PORAT, engineer, subject of the King of Sweden, residing at 4 Västra Trädgårdsgatan, Stockholm, Sweden, have invented certain new and useful Improvements in Feeding Devices for Pulverulent Fuel, of which the following is a specification.

10 The present invention relates to those devices for feeding pulverulent fuel to furnaces, in which the feed is effected by air or gas currents, which are driven or drawn through one or more fuel conduits, extending between a fuel receptacle and the furnace.

15 An important feature of the invention consists in the fact that the discharge end of the air supply tube or another member is arranged in such a way, that it prevents the powder in the receptacle from falling by gravity into the receiving opening of the fuel pipe, which opening is faced upward.

20 Another important feature of the invention consists in the fact that the gaseous medium is caused to flow downwardly and outwardly at the delivering end of said air supply tube before entering into the fuel pipe.

25 Another feature of the invention consists in means for adjusting the receiving end of the fuel pipe to and from the delivering end of the air supply tube.

30 Another important feature of the invention consists in means whereby the supply of a gaseous medium through the air supply tube to the receptacle will be interrupted simultaneously with the closing of the fuel outlet.

35 Another important feature of the invention consists in means for closing the receiving end of the fuel pipe automatically when the adjustable pipe end is adjusted to a certain position.

40 This application is a division of my application Serial Number 95387, filed May 4th, 1916.

45 A practical embodiment of the invention is shown in the accompanying drawing in which—

The figure shows a vertical section of the apparatus.

In this apparatus air is drawn in by the draft of the furnace through the tube 1, projecting into the powder receptacle A. This tube is enlarged at its lower end and provided with a cone 2, which is arranged in such a way that an annular opening is formed, through which the air passes so as to act upon and whirl up the powder which passes through the pipes 3 and 4 into the furnace.

A handle 6 is connected with the pipe 3 and a damper 5, whereby the powder and combustion air feeding devices can be simultaneously opened, closed or adjusted to the desired feeding position.

By lowering or raising the pipe 3 a greater or less feed is obtained and if the pipe 3 is raised so as to engage the cone 2 the feeding is interrupted.

7 is an air valve which is arranged at the upper end of the tube 1 and which is normally held open by the spring 8. The valve 7 acts to partially or fully close the tube 1 at sudden variations in the draft. Through the opening 9 at the lower end of the pipe 4 air is sucked in, which will contact with the powder passing through said pipe.

In this embodiment the receiving opening of the fuel pipe 3 is faced upward, but in spite thereof the fuel is prevented from falling by gravity into said opening since the discharge end of the air supply tube 1 is arranged above the fuel receiving opening in such a way that the said opening will be located in the powder free space formed below the cone 2 in the tube 7 when the feed is interrupted. Said space also forms an essential part of the mixing chamber, where the air and whirled-up fuel are mixed together before escaping through the fuel pipe.

According to the figure the air flows downwardly and outwardly at the delivering end of the air supply tube before entering into the receiving opening of the fuel pipe, whereby the adjacent part of the fuel mass will be effectively whirled up before escaping to the furnace.

It will be understood, then when pipe 3 is brought to its uppermost position, in which its receiving opening is closed from communication both with the receptacle A

and with the tube 1, no air currents will flow through tube 1 into the receptacle.

What I claim is:

1. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe.
2. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle having downwardly converging walls, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, and a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, and whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe.
3. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle and at some distance above the bottom thereof, and a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe.
4. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, the receptacle being contracted downwardly and the said fluid supply

ply tube extending through the wall into said contracted lower part of the receptacle, and the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being arranged at some distance above the bottom of the receptacle, and a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening.

5. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, the receptacle being contracted downwardly and the said fluid supply tube extending through the wall into said contracted lower part of the receptacle, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being arranged at some distance above the bottom of the receptacle, and a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe.

6. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe, and means for preventing said current from flowing in a straight line from the discharge part of the fluid supply tube into the receiving opening of the fuel pipe.

7. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, means for preventing the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe, 130

and means for adjusting the receiving end of the fuel pipe to and from the delivering end of the fluid supply tube.

8. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, means for preventing the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe, and means for simultaneously interrupting said current and closing the receiving opening of the fuel pipe.

9. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, a member inserted in the receptacle so as to form, in the lower part thereof, a space which is free from powder even when the receptacle is charged, the receiving opening of the fuel pipe being faced upward and being located in the said free space, and means for adjusting one of said openings to a desired point in said free space, and whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe.

10. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, and a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, the receiving opening of said fuel pipe being located below the discharge end of said fluid supply tube, whereby the fluid from said tube will whirl up and bring along with it a quantity of fuel into the said fuel opening, said opening and said fluid discharge end further being arranged in such a way that the fluid discharge end prevents the fuel from falling by gravity into the fuel pipe, so that only the quantity of fuel which is whirled up by the fluid will escape through the fuel pipe.

11. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, and a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe, said member forming a part of the fluid supply tube.

12. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid into the mass in said receptacle, the receptacle being contracted downwardly and the said fluid supply tube extending through the wall into said contracted lower part of the receptacle, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being arranged at some distance above the bottom of the receptacle, and a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, said member forming a part of the fluid supply tube.

13. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe, and means for causing the air to flow out at several points from the periphery of the tube in an outward direction with respect to the axis of the discharge end of said tube.

14. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge open-

ing of the fluid supply tube being both arranged in the lower part of the receptacle, a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe, and means for varying the distance between the said opening and the discharge end of said fluid supply tube.

15. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, and a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe, one of said openings located in the receptacle being movable with respect to its body portion and connected through a lever and link mechanism with an operating handle.

16. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, and a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, whereby a fluid current from said fluid supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe, one of said openings being movable endwise in the bottom wall of the receptacle and connected with an operating handle.

17. In a feeding device for pulverulent fuel for furnaces, the combination of a powder receptacle, a fuel outlet pipe, a tube for supplying a fluid or other gaseous medium into the mass in said receptacle, said fluid supply tube extending through the wall of the receptacle to the interior thereof, the

receiving opening of the fuel pipe and the discharge opening of the fluid supply tube being both arranged in the lower part of the receptacle, and a member inserted in the receptacle above the receiving opening of the fuel pipe so as to prevent the fuel from falling by gravity into said opening, whereby a current from said air supply tube will penetrate, whirl up and bring along with it a quantity of fuel from the receptacle through the fuel pipe, said fluid supply tube having a discharge opening in the form of an annular slot through which the fluid is caused to pass laterally with respect to the axis of the discharge end of the fluid supply tube.

18. In a feeding device for pulverulent fuel for furnaces, a powder receptacle, a tube for supplying a fluid medium into the said receptacle, and a fuel outlet pipe, the receiving opening of said fuel pipe being located below the delivering end of said fluid supply tube, whereby the fluid from said tube will whirl up and bring along with it a quantity of fuel into the said fuel pipe, said opening and said fluid delivering end further being arranged in such a way that the fluid delivering end prevents the fuel from falling by gravity into the fuel pipe, so that only the quantity of fuel which is whirled up by the fluid will escape through the fuel pipe, the delivering opening of said fluid supply tube being in the form of an annular slot.

19. In a feeding device for pulverulent fuel for furnaces, a powder receptacle, a tube for supplying a fluid medium into the said receptacle, and a fuel outlet pipe, the receiving opening of said fuel pipe being located below the discharge end of said fluid supply tube, whereby the fluid from said tube will whirl up and bring along with it a quantity of fuel into the said fuel opening, said opening and said fluid discharge end further being arranged in such a way that the fluid discharge end prevents the fuel from falling by gravity into the fuel pipe, so that only the quantity of fuel which is whirled up by the air will escape through the fuel pipe, the discharge opening of said fluid supply tube being in the form of an annular slot through which the fluid is caused to pass laterally with respect to the axis of the discharge end of the fluid supply tube.

In testimony whereof I affix my signature in presence of two witnesses.

KARL HJALMAR VILHELM von PORAT.

Witnesses:

JACOB BAGGE,

CHARLES N. LOFEL.