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V. Z. CARACRISTI

PULVERIZING SYSTEM

Filed Jan. 12, 1922

Fig. 1.

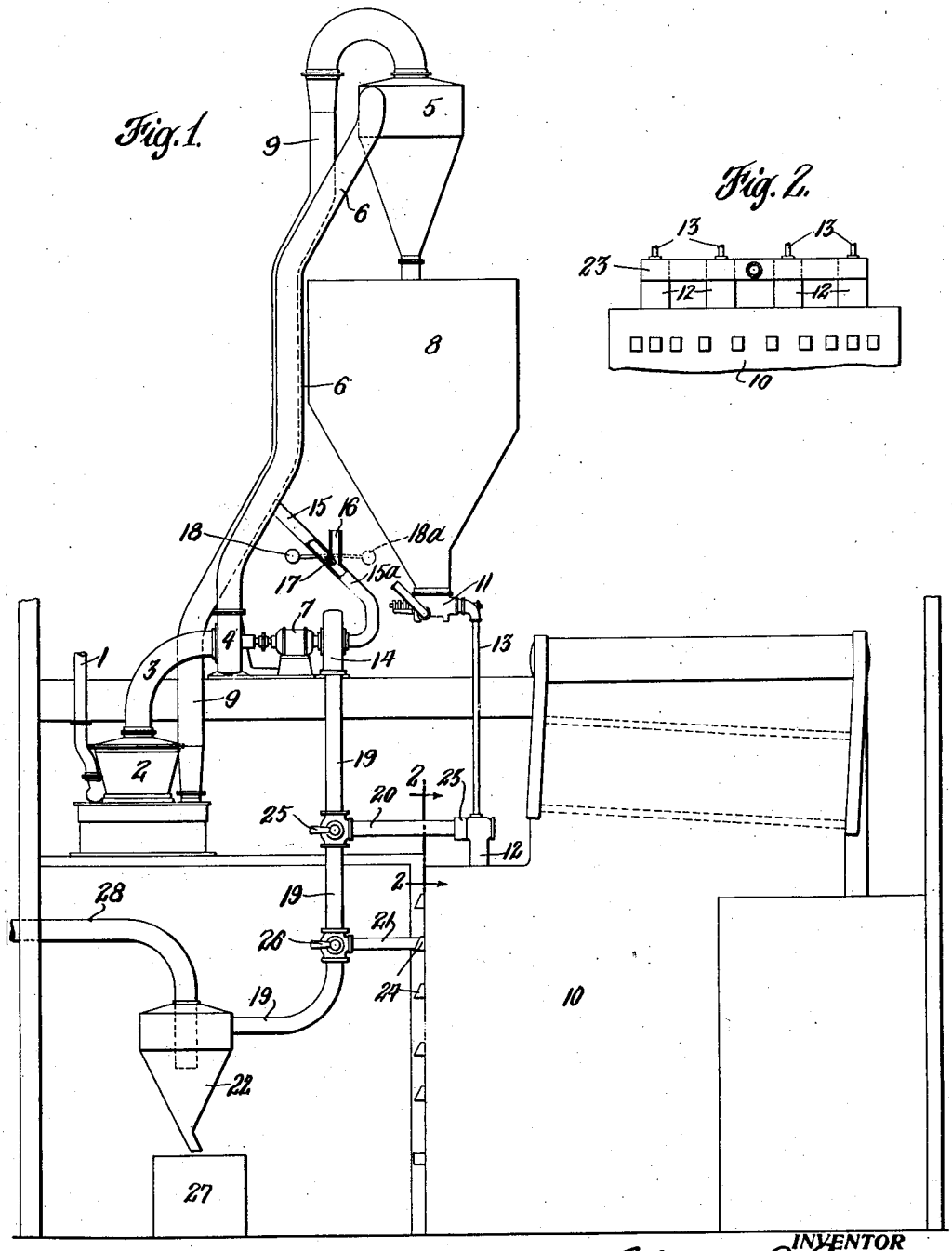


Fig. 2.

WITNESS:
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UNITED STATES PATENT OFFICE.

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PULVERIZING SYSTEM.

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To all whom it may concern:

Be it known that I, VIRGINIUS Z. CARACRISTI, a citizen of the United States, residing at Bronxville, in the county of Westchester and State of New York, have invented new and useful Improvements in Pulverizing Systems, of which the following is a specification.

This invention relates to what is known in the art as a return air pulverizing system such, for example, as is employed in the pulverizing of coal for use in a pulverized fuel burning furnace. Such systems use a pulverizer from which the pulverized coal is withdrawn by means of an exhauster. The stream of fuel laden air so withdrawn is delivered to a separator, commonly called a cyclone separator, which removes the powdered coal from the air, the air being returned to the pulverizer for reuse. There are times during the operation of this type of pulverizing system during which an excess of pressure is developed in the system due to a surplus quantity of air taken in either with the fuel or through leakage somewhere in the pulverizer housing. The surplus air usually carries away with it a certain amount of fine dust in suspension which has to be removed through some auxiliary separator means normally connected to the system or simply by means of a vent to the atmosphere.

It is the primary object of this invention to eliminate such secondary air line connections by substituting therefor a mechanical means such as an exhaust fan arranged to positively remove the excess or surplus air from the system. A further object of the invention is to deliver this surplus air together with its entrained pulverized material either to the burner of a pulverized fuel burning furnace or into the the furnace directly without passing through the burner or to a second cyclone collector. Still another object of the invention is to eliminate dust and dirt from the operation of such a system and to cut down the cost of the original installation. To state the principal object in other words is to say that it relates to the removal of "stray" air brought in through normal operating conditions so that there can be no building up of pressure and therefore no leakage or loss to the atmosphere.

These together with such other objects as may hereinafter appear or are incident to the invention, I obtain by means of a construction which is illustrated in preferred form in the accompanying drawing, wherein:

Fig. 1 is a side elevation of a typical return air pulverizing system as used in connection with the burning of pulverized coal to which my invention has been applied, there being a small portion of it in section to illustrate a detail. Fig. 2 is a partial front elevation looking in the direction of the arrows 2—2 of Fig. 1.

Referring to the drawing, fuel from a crushed coal bin, not shown, is delivered through a pipe 1 to the pulverizer 2 and the powdered coal is withdrawn from the pulverizer through the conduit 3 by means of the exhauster 4 and delivered to a separator 5 through the delivery line 6. A motor 7 or any other suitable source of power is used to drive the exhauster 4.

From the separator 5 the powdered coal falls into a bin 8 and the air returns to the pulverizer 2 through the return line 9.

The powdered fuel is delivered for combustion purposes to the furnace 10 by means of any well known or preferred arrangement, the one herein shown comprising a feeder 11 and a burner 12 connected by means of a pipe 13. If desired there may be a plurality of burners 12 and the installation herein shown contemplates such plurality as shown in Fig. 2.

In the operation of the system including the above apparatus there occur at more or less frequent intervals alternate periods of pressure and vacuum. The pressure periods, as above pointed out, develop because of a surplus of air taken in either with the fuel or through leakage somewhere in the system and at such times choking might result if relief were not provided for in some way. Instead of venting to the atmosphere as has heretofore been customary I

propose to provide a mechanical means such as the exhauster 14 for removing the surplus air and the suspended dust which it carries. I have shown this exhauster 14 as run from the shaft of the motor 7 which runs the exhauster 4 although another motor or any other means for driving it that may be suitable or desirable can be used. The exhauster is connected to any point in the system by means of a pipe or conduit 15. In the illustration I have shown this pipe 15 as being connected to the return line 9. A vent 16 to the atmosphere is provided on this pipe 15. For purposes of the description I have given the portion of the conduit 15 which is located between the vent 16 and the exhauster 14 the reference character 15^a. I place a valve 17, which is sector shape in cross section as shown in the drawing in the pipe $15—15^a$ in such position that it will control both the opening through the pipe $15—15^a$ and the opening to the atmosphere through 16. When the valve 17 is in position to close the pipe $15—15^a$ the vent to the atmosphere through 16 is open to the portion of the pipe 15^a. This is the position shown in full lines in the drawing. The valve 17 is weighted by a weight 18 but the value of the weight is so proportioned to the area of the valve and to the suction in the return line 9 that said suction or pull will normally hold the valve 17 in position to close the conduit $15—15^a$ as shown in Figure 1. At such times the exhauster 14 is allowed to draw air in through the opening 16.

Should, as frequently occurs, an excessive pressure develop in the system the valve 17 will open and as it opens it will close the vent 16 and the exhauster 14 will draw the surplus air together with its fuel in suspension from the system.

Should the conduit 15 be connected to the system at some point in the delivery line 6 there would normally be a slight pressure in the portion 15 of the conduit $15—15^a$ in which event the weight on the valve 17 should be on the reverse side as indicated in dotted lines in the figure. This position I have referred to by the character 18^a and it will readily be seen that in this position the valve 17 will tend to maintain the pipe $15—15^a$ closed until the predetermined excess of pressure is developed in the portion 15. It will, therefore, be seen that the automatic valve 17 tends to keep a balanced pressure on both sides of it in the portions 15 and 15^a.

The air exhausted by the exhauster 14 can be utilized in any one of a number of ways or rather disposed of in any one of a number of ways and in the drawing I have illustrated three. It may be delivered through the burner or burners 12 through the pipes 19 and 20 or it may be delivered directly to the furnace through the pipes 19 and 21 or it may be delivered to a second cyclone separator 22. If the pipe 20 is to deliver to a series of burners 12 it is necessary to provide a manifold 23. If the excess is delivered directly to the furnace I prefer to introduce it through one or more of the air openings 24 in the front of the furnace. The pipes 19 and 20 are controlled by means of a valve 25 and the pipes 19 and 21 by means of another valve 26. If the excess air with its material in suspension is delivered to the separator 22 the powdered coal is collected in the bin 27 and the excess air is discharged to the atmosphere through the pipe 28. The separator 22 and the bin 27 are located in any desired positions the ones I have shown being simply for purposes of illustration.

I claim:

1. A pulverizing system provided with a pulverizer, and an air conveyor disposed between the pulverizer discharge and an inlet of said pulverizer, and positively acting means for exhausting air from said conveyor when the air in said conveyor becomes excessive.

2. In a return air pulverizing system, the combination of an exhauster, a connection between the exhauster and the system, and a valve normally closing said connection but adapted to open upon development of a predetermined excess of pressure in the system.

3. In a return air pulverizing system, the combination of an exhauster, a connection between the exhauster and the system, an opening to the atmosphere from said connection, and a valve normally closing said connection and uncovering said opening but adapted to open said connection and cover said opening upon development of a predetermined excess of pressure in the system.

4. In a return air pulverizing system provided with a pulverizer and conveyor means, the combination of positively acting means for exhausting excess air in said system.

5. A return air pulverizing system comprising in combination, a pulverizer, a separator, an exhauster for drawing a stream of air and material from the pulverizer, a delivery line to the separator, a return line to the pulverizer, a second exhauster, a connection between the second exhauster and the return line, and a valve in said connection normally held closed by the pull in the return line but adapted to open upon development of a predetermined excess of pressure in the system.

6. In a return air pulverizing system provided with a pulverizer and conveyor means, the combination of positively acting means for exhausting excess air with its entrained fuel in said system and means for delivering said air and fuel to another point of use.

7. In a return air pulverizing system pro-

vided with a pulverizer and conveyor means, the combination of positively acting means for exhausting air from the system and means for delivering it to another point of use.

8. In combination a furnace, a return air pulverizing system provided with a pulverizer and conveyor means, positively acting means for exhausting air from the system and delivering it to the furnace.

In testimony whereof, I have hereunto signed my name.

VIRGINIUS Z. CARACRISTI.