

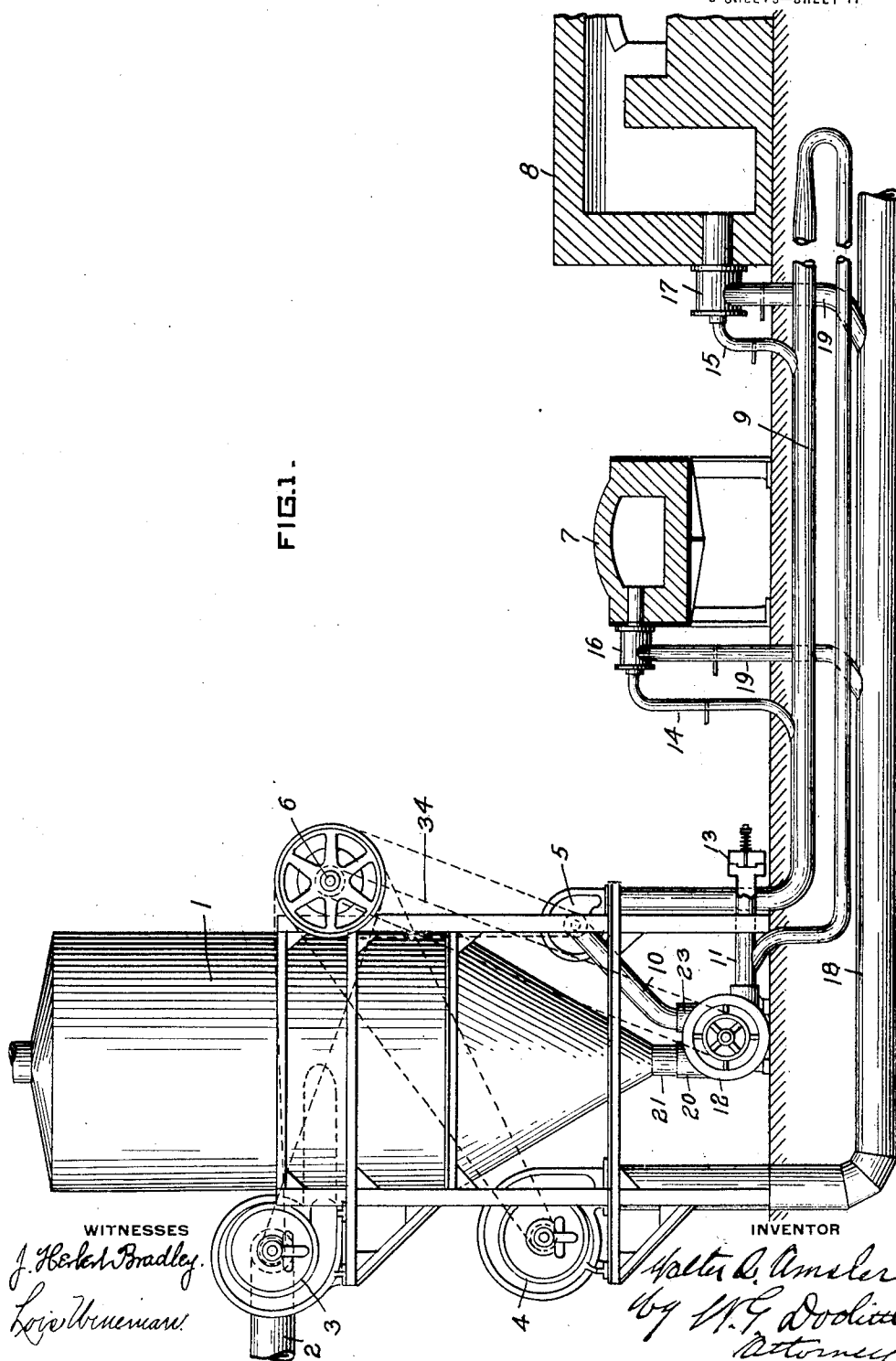
1,370,872.

W. O. AMSLER.
PULVERIZED FUEL FEEDER.
APPLICATION FILED FEB. 3, 1917.

Patented Mar. 8, 1921.

2 SHEETS—SHEET 1.

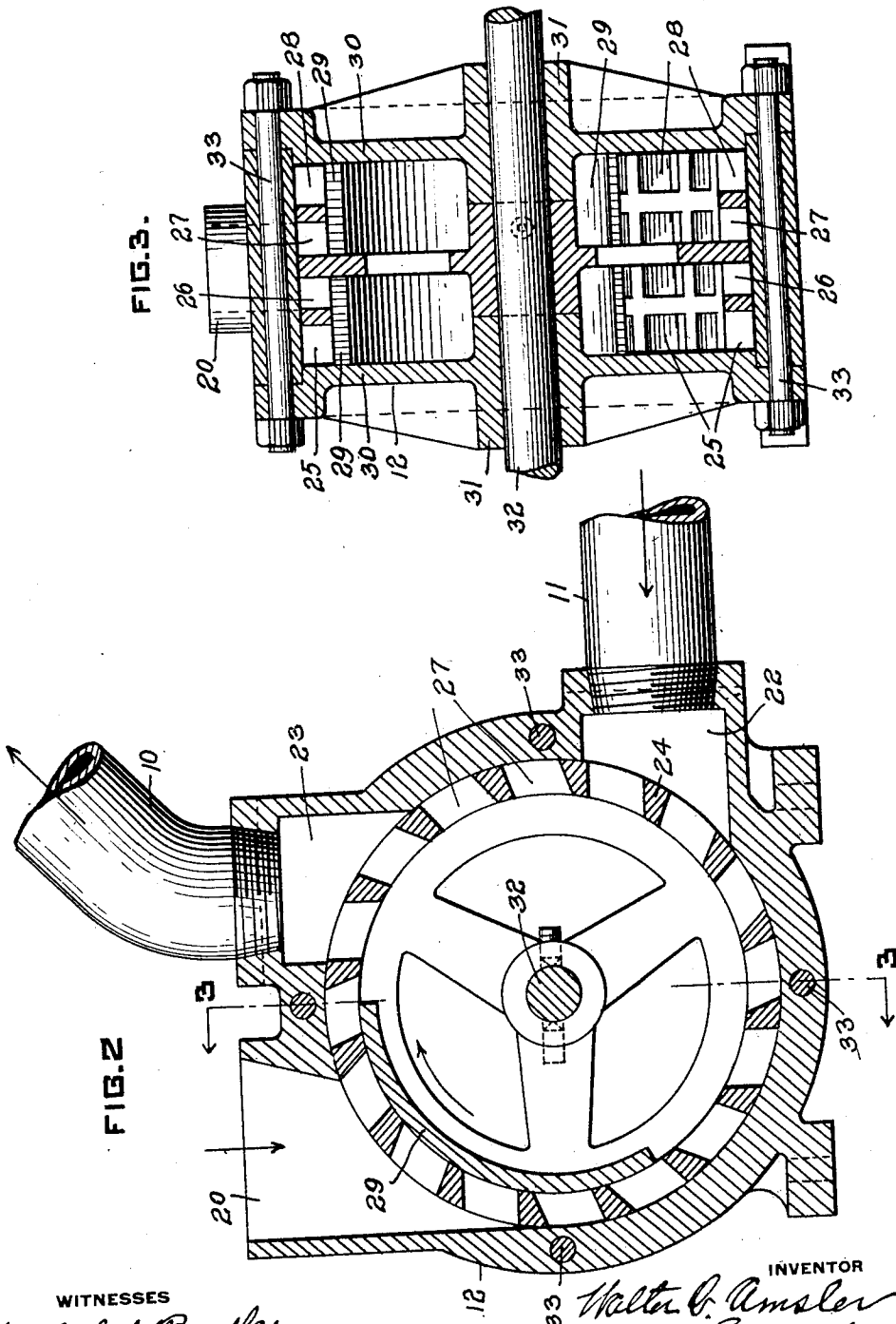
FIG. 1.



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WITNESSES
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UNITED STATES PATENT OFFICE.

WALTER O. AMSLER, OF EDGEWOOD, PENNSYLVANIA.

PULVERIZED-FUEL FEEDER.

1,370,872.

Specification of Letters Patent.

Patented Mar. 8, 1921.

Application filed February 3, 1917. Serial No. 146,376.

To all whom it may concern:

Be it known that I, WALTER O. AMSLER, a citizen of the United States, residing at Edgewood, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Pulverized-Fuel Feeders, of which the following is a specification.

My invention relates to apparatus for feeding pulverized fuel and particularly to apparatus of this character employed in connection with a plurality of furnaces, burners or other fuel consuming apparatus.

Among the objects of the present invention are:—to provide simple and efficient apparatus of the class mentioned by means of which a constant and uniform fuel supply may be furnished to one or to a plurality of fuel consuming apparatus; to provide a single closed circuit for a fluid carrier and the fuel carried in suspension therein; and to provide means for maintaining a uniform fuel density at each furnace throughout the closed circuit.

In the accompanying drawings, which illustrate an application of my invention,

Figure 1 is a diagrammatic view, the view being partly in elevation and partly in section, showing a source of fuel supply or storage bin, a plurality of furnaces, and the fuel feeding mechanism in connection therewith.

Fig. 2 is a vertical sectional view of a preferred construction of apparatus for introducing the fuel in regulated quantities into the closed circuit.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2.

Referring to the drawings, 1 designates a fuel bin or reservoir designed to contain the powdered fuel which is fed thereto from a pulverizing apparatus, not shown, through a pipe 2, the fuel being designed to be drawn through pipe 2 by means of a fan 3. Fan 3 as well as fans 4 and 5 employed in my system, and hereinafter more particularly referred to, are driven by means of a series of pulley wheels and belts actuated from a common drive shaft 6, the latter being designed to be coupled with an electric motor or other source of power, not shown. 7 and 8 designate furnaces to which it is desired to feed powdered fuel, and it will

be understood that while I have shown only two furnaces, a greater number of furnaces or fuel consuming apparatus may be employed and supplied with the powdered fuel.

The powdered fuel is conveyed to the respective furnaces through a main fuel supply pipe 9 which constitutes a portion of the closed conveyer circuit. As illustrated, this pipe leads from the discharge end of the centrifugal fan 5, along and in proximity with the several fuel consuming apparatus, said pipe being returned to the inlet side of fan 5 by means of a connecting pipe 10, horizontally disposed pipe 11, and an automatic feed regulating or measuring and fuel introducing structure 12, the latter being interposed between the inner ends of the said pipes 10 and 11 and connecting the same. It will be understood that instead of locating the measuring and fuel introducing means as shown, said means may be located at any desired point in the closed circuit in advance of the fuel consuming apparatus.

From the above, it will be understood that the pipes 9 and 11, structure 12, and connecting pipe 10 constitute the closed circuit for the circulation of a fluid fuel carrier and the fuel from the source of fuel supply to the respective furnaces and back from said furnaces to the means for introducing the powdered fuel into the system.

The outer end of pipe 11 is provided with a valve 13 adapted to be opened inwardly by a partial vacuum created in this part of the circuit by the loss of air, and to introduce into the closed circuit the amount of air taken from the said circuit in conveying the powdered fuel to the respective furnaces. 14 and 15 designate valve controlled pipes or branches leading from the main pipe 9 to the respective furnaces or to burners 16 and 17 of any well known type. For the purpose of aiding combustion, secondary air is fed to the respective burners through main pipe 18 and branches 19, the secondary air being introduced into main pipe 18 by means of the centrifugal fan 4.

To successfully operate powdered fuel feeding systems of the type of the present invention, and to provide the desired uniform fuel density at each furnace, through-

out the system, I consider it essential to maintain a closed circuit for the fluid carrier or air stream as well as the fuel carried in suspension therein. To effect this end, I make, as above mentioned, the fuel introducing means a part of the closed circuit and maintain a constant flow of air or a fluid carrier through said means in the presence of an excess amount of powdered fuel. As the quantity of powdered fuel or fuel dust carried by an air stream is proportional to the square of the speed of the air stream, it will be evident that with a constant speed and an excess of powdered fuel, the density of the fuel in the stream as it leaves the fuel introducing means must be constant, and that in the closed circuit, as disclosed, the density of the fuel will remain uniform throughout the circuit regardless of the quantity of fuel taken from the stream while in transit up to some point in the circuit, such as pipe 11, or at a point where additional air is introduced to replace the air utilized. Between this point and the feeding device there will, of course, be a variation in the fuel density depending upon the amount of air introduced. In practice, this variation in fuel density is utilized to control the quantity of pulverized fuel introduced to the system and to thus replace the fuel removed. Under my invention, the exact amount of fuel and air withdrawn from the stream during circulation is automatically restored thereto.

It will be understood that as the stream is passed through the fuel introducing means, constituting a part of the closed circuit, and through the suspended excess fuel in said means, each cubic unit of fluid will take off a certain quantity or unit of fuel and that as the said unit of fluid with its fuel is discharged from the closed circuit the density of the stream will not be affected until additional air is introduced to the system.

The means or structure 12 for regulating the feed of fuel or measuring and introducing the fuel to the stream which I preferably employ in connection with my feeding system includes a fixed cylindrical casing having a fuel inlet nozzle 20 disposed in communication with a feed pipe 21 located at the lower end of the fuel reservoir: a stream inlet nozzle 22 and a stream outlet 23 respectively in communication with pipes 11 and 10 of the closed circuit. Mounted within the casing is a rotor 24 having four rows of pockets 25, 26, 27 and 28, the two inner rows 26 and 27 being designed to feed the fuel from the inlet nozzle 20 to the interior of the rotor and into the air stream passing therethrough, while the two outer rows 25 and 28 are employed for the purpose of aiding the inner rows in picking up the excess of fuel and returning it to

and past baffle plates 29 located adjacent to inlet nozzle 20. Said baffle plates 29 constitute a part of detachable end of cover members 30, said last mentioned members each being formed with bearings 31 in which is mounted a rotor shaft 32 and being connected together and to the casing by means of bolts 33.

As illustrated, the rotor is driven from shaft 6 by a belt 34. The powdered fuel entering through inlet nozzle 20 falls into the middle rows of pockets 26, 27, and is carried by the rotor over an end of the baffle plates and drops down into the interior of the rotor, where a certain amount is caught by the stream and projected into the stream outlet 23. The excess of fuel falls to the lower part of the casing and is then carried upwardly as above described. It will be understood that when the rotor is not in operation the baffles 29 prevent the passage of fuel from the fuel inlet nozzle 20. It will be noted that when the carrying air in the conduit is saturated with fuel dust it can carry no more out of the feeding mechanism, consequently, the fuel dropping out of the pockets at the top fills those at the bottom, so that the rotor will cease to feed the fuel from inlet nozzle 20.

It will also be noted that the air current or stream passes through the path of the falling powdered fuel and twice passes through the pockets formed in the periphery of the rotor, thus insuring intimate mixture of the air and fuel, and providing a cleaning medium for the pockets of the rotor.

What I claim is:—

1. In a system for feeding pulverized fuel to one or more furnaces, the combination with a furnace branch pipe, of a closed conveyor circuit in which a continuously circulating stream is maintained, said closed circuit including a fuel supplying device having means for maintaining an excess quantity of fuel in suspension, a blower, a return pipe connection from the branch pipe to the fuel supplying device, said device adapted to direct the stream from the return pipe through the fuel suspended in said device, and means for admitting fuel free fluid to that portion of the stream flowing from the branch pipe toward the fuel supplying device.

2. In a system for feeding pulverized fuel to one or more furnaces, the combination with a furnace branch pipe, of a closed conveyor circuit in which a continuously circulating stream is maintained, said closed circuit including a fuel supplying device having means for maintaining an excess quantity of fuel in suspension, a blower, a pipe connecting the blower and supplying device, a pipe connection between the blower and branch pipe, a return pipe connection from the

branch pipe to the fuel supplying device,
said device adapted to direct the stream
from the return pipe through the fuel sus-
pended in said device, and means for ad-
5 mitting fuel free fluid to that portion of
the stream flowing from the branch pipe to-
ward the fuel supplying device.

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

WALTER O. AMSLER.

Witnesses:

LOIS WINEMAN,
ALICE B. DICE.