

J. W. ZELL.
COAL DUST BURNER.
APPLICATION FILED MAY 6, 1909.

942,696.

Patented Dec. 7, 1909.

2 SHEETS—SHEET 1.

Fig. 1

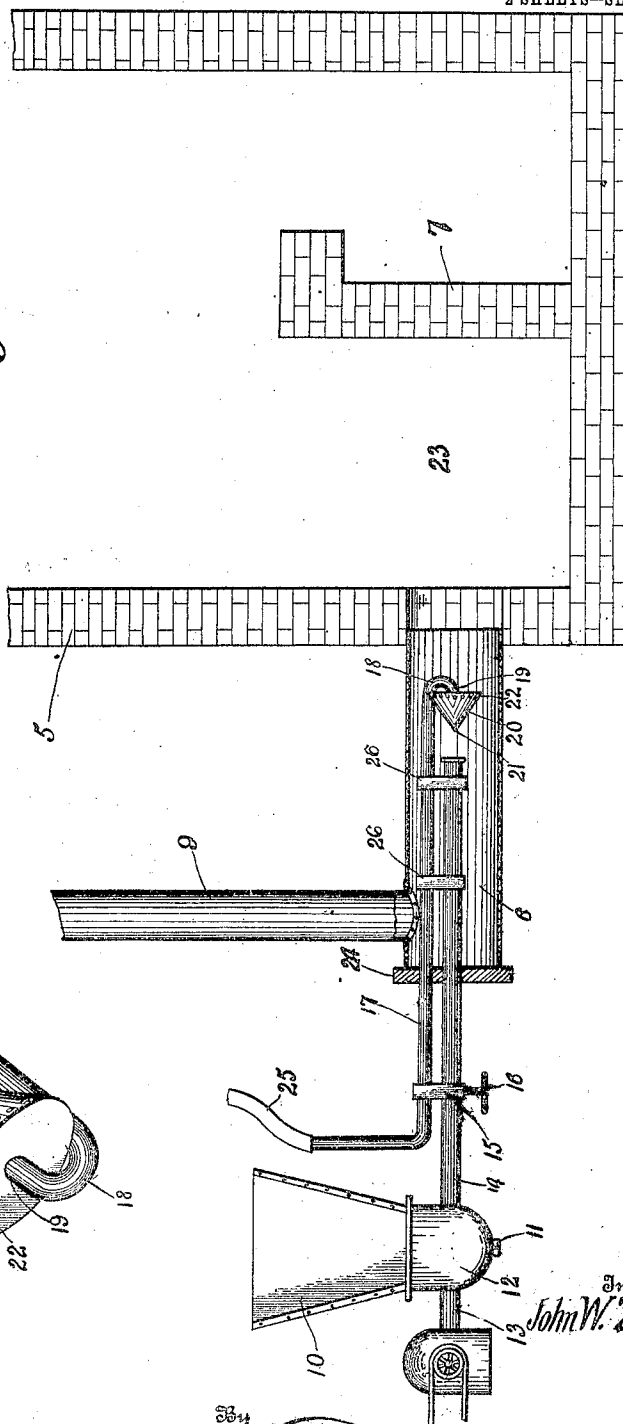
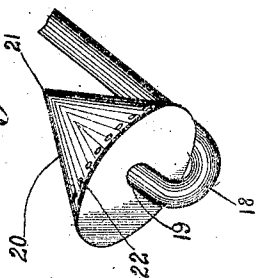


Fig. 2.



Witnesses

John W. Zell
John W. Zell

Inventor

John W. Zell

Attorneys

J. W. ZELL.
 COAL DUST BURNER.
 APPLICATION FILED MAY 6, 1909.

942,696.

Patented Dec. 7, 1909.
 2 SHEETS—SHEET 2.

Fig. 3.

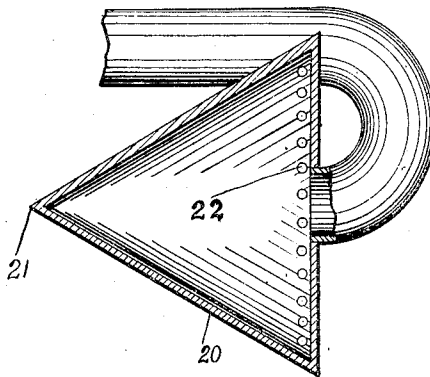
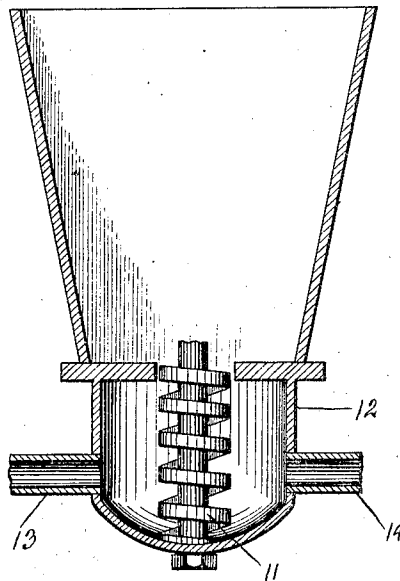


Fig. 4.



Inventor
 John W. Zell

Witnesses
 J. R. Woodworth
 John A. Donigan

By *Samuel Chandler*
 Attorney

UNITED STATES PATENT OFFICE.

JOHN W. ZELL, OF DUNCANNON, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO GEORGE PENNELL, OF DUNCANNON, PENNSYLVANIA.

COAL-DUST BURNER.

942,696.

Specification of Letters Patent.

Patented Dec. 7, 1909.

Application filed May 6, 1909. Serial No. 494,355.

To all whom it may concern:

Be it known that I, JOHN W. ZELL, a citizen of the United States, residing at Duncannon, in the county of Perry, State of Pennsylvania, have invented certain new and useful Improvements in Coal-Dust Burners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in furnaces and more particularly to the type adapted for the use of powdered coal as a fuel.

The invention consists in an attachment for a melting or puddle furnace wherein high degrees of temperature are required to perform the melting function. It is customary in the use of furnaces of this type to employ a pipe which serves as a combined pressure and fuel distributor to the combustion chamber of the furnace. The general method consisting in the employment of a hopper which feeds coal dust into a pipe, the coal dust as it enters the latter falls in the path of a blast of air or steam which directs it to the combustion chamber. This arrangement has many disadvantages, chief among which is that the blast of mixed air and coal dust impinges against the wall of the furnace and in time forces an opening through the latter. The present invention aims to remedy this defect by employing a casing located in advance of the combustion chamber and a spreader adjustably fitted within the casing and so positioned that the mixture of air and coal dust will be deflected and spread over the entire surface of the combustion chamber.

Another object is the provision of an improved form of spreader through which an air or steam blast is directed and from which it emerges at right-angles to the feeding blast, whereby the latter blast is positively prevented from impinging at one spot on the furnace wall.

With these and other objects in view as will more fully hereinafter appear, the present invention consists in certain novel details of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings and more particularly pointed out in the appended claims, it being understood that various

changes in the form, proportion, size and minor details of the device may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings forming part of the specification:—Figure 1 is a vertical sectional view of the lower portion of a puddling furnace showing the casing in longitudinal section and applied to the furnace and showing the fuel feed pipe, blast pipe and deflector arranged within the casing and also showing in side elevation the apparatus at one end of the fuel feed pipe for supplying and forcing fuel through the fuel feed pipe. Fig. 2 is a detailed perspective of the spreader. Fig. 3 is a longitudinal section of the spreader. Fig. 4 is a similar view of the hopper.

Similar numerals of reference are employed to designate corresponding parts throughout.

The furnace is designated in general by the numeral 5, and is provided with the usual side and end walls. The combustion chamber within the furnace is designated by 23, and is separated from the heating or melting portion by the dead or baffle wall 7. The front wall of the furnace is provided with the usual feed opening and located in advance of the front wall and surrounding the opening is one end of a circular casing 6, this casing is preferably of metal and may be of any required length and at its outer end is provided with a cap or cover 24, which may be threaded or otherwise secured to the front end of the casing. A blast pipe 9 rises from the upper side and adjacent the outer end of the casing and has its upper end communicating with a blast fan (not shown) which drives a blast to the combustion chamber 23 through the casing 6.

A hopper designated by the numeral 10, is disposed in front of the furnace and at a suitable distance therefrom. It must be understood that this hopper is shown merely for purposes of illustration and I am not to be limited to its use, since from what will appear later, it will be understood how various other forms of feeding hoppers may be equally as well employed. The hopper is shown provided with a vertically disposed feed screw 11, arranged in the throat of the hopper. Leading into one side of the throat 12 is a pipe 13, the opposite end of which

communicates with a blast fan (not shown). The inner end of the blast pipe 13 is located beneath the lower end of the feed screw 11 and in direct alinement with the inner end of a feed pipe 14. The latter extends from that side of the throat opposite the pressure pipe 13 and leads through an opening in the cap 24 and with the casing 6, where it terminates at a point substantially in alinement with the intermediate portion of the said casing. Thus it can be seen when the hopper 10 is filled with powdered coal and the feed screw 11 turned by any well known means that the falling particles of coal will fall into the path of the blast through the fuel feed pipe and by the said blast be directed into the fuel feed pipe 14 and then through the casing 6 into the combustion chamber where they will be consumed in the usual manner.

By referring now to Fig. 1 it will be seen that a blast pipe 17 is disposed directly above and parallel with the fuel feed pipe 14. This pipe is less in diameter than the fuel feed pipe 14 and the outer end communicates with one end of a flexible tube 25 which leads from a steam supply. The opposite end of the pipe 17 extends into the casing 6 through an opening in the cap 24 directly above the opening for the pipe 14 and extends to a point considerably in advance of the fuel feed pipe 14 and adjacent the feed opening of the furnace. The extreme inner end portion of the pipe 17 is curved downwardly as shown at 18, and thence extended outwardly as shown at 19, with its outlet disposed in axial alinement with the outlet of the fuel feed pipe 14.

A deflector or spreader is designated by the numeral 20 and is shown to be a conical shaped body, the central portion of the base of which is secured to the blast pipe 17 whereby its apex 21 is in true axial alinement with the outlet of the supply pipe 14. The deflector 19 is provided adjacent its base with a plurality of spaced openings 22 through which the air or steam escapes. Thus it will be seen when the mixture of coal dust and air emerges from the inner end of the pipe 14 as before described, it will abut against the surface of the spreader or deflector 20, this in itself would be sufficient to deflect the mixed stream sufficiently to prevent it impinging at a certain spot on the baffle or dead wall 7 of the furnace, in order to positively deflect the stream, however, and at the same time distribute it evenly over the surface of the combustion chamber steam or air is admitted through the tube 25 and pipe 17 into the deflector from which it escapes through the holes 22 and will issue at right-angles to the mixed stream of coal dust and air whereby the latter will be scattered in all directions over the surface of the combustion chamber.

With this construction it can be seen that I have provided a device which is comparatively simple in structure and inexpensive to manufacture and which will operate to both save the baffle wall and by virtue of the even distribution of the mixture of dust and air serve to generate a greater heat. By causing live steam to enter the combustion chamber through the openings 22 will greatly add to the utility of the device inasmuch as the particles of coal dust will remain sufficiently long in the combustion chamber to be thoroughly consumed so that there will be practically no waste such as heretofore has been the case with devices of this kind.

It is well known in devices of this kind that coal dust when damp is difficult to spread and also when extremely fine has a tendency to fly and not spread evenly over the fire. In order to overcome this and provide a construction whereby the deflector may be adjusted to and from the supply pipe, the following construction is employed:—By referring now to Fig. 1 it will be seen that located within the casing 6 are a pair of spaced blocks 26; these blocks are preferably of metal and are rectangular in contour and adjacent their lower ends are provided with transverse openings adapted to receive the fuel feed pipe 14, which is securely held therein. The upper ends of the blocks terminate in semi-circular seats which loosely receive the blast pipe 17. Located in advance of the casing is a rectangular block 15. This member is provided with transverse openings adjacent its opposite ends. The upper of these openings is slightly less in diameter than the lower and receives the pipe 17, which is fixedly secured therein, while loosely fitted in the lower opening is the fuel feed pipe 14. The lower end of the block is provided with a vertical opening which receives a set screw 16, the inner terminal of which binds on the fuel pipe 14. Thus it will be seen that by turning the set screw from engagement with the pipe 14 the pipe 17 may be adjusted longitudinally of the casing so as to bring the deflector or spreader adjacent to or away from the outlet of the pipe 14.

With this construction it is obvious by loosening the set screw the pipe 17 by virtue of the flexible tube may be adjusted in the direction of its length, so as to set the conical deflector at any required distance from the outlet of the mixing tube 14, this construction will be found very advantageous where blasts of various strengths are employed.

From the foregoing it will be seen I have provided a device which is simple in structure and comparatively inexpensive to manufacture, and which may be readily applied to any form of heating furnace now in use.

Having thus described my invention what is claimed as new, is:—

1. In a device for supplying a mixture of coal dust and fluid to the combustion chamber of a furnace, the combination with a furnace; of a casing arranged exteriorly of the furnace; of a coal dust feed pipe disposed within said casing and a liquid blast pipe adjustably fitted within the casing and arranged parallel with and exterior of the feed pipe, said blast pipe being provided at its inner end with a fuel deflector located in the casing and having openings to permit the liquid from the blast pipe to enter the casing at right-angles to the coal dust from the feed pipe.

2. In a device for supplying a mixture of coal dust and fluid to the combustion chamber of a furnace, the combination with a

furnace; of a casing arranged exteriorly of the furnace, a coal dust feed pipe disposed within said casing and a liquid blast pipe adjustably fitted within the casing and arranged parallel with and exterior of the feed pipe, a hollow fuel deflector located in the casing and connected with the blast pipe, said fuel deflector being arranged in axial alinement with the feed pipe and having openings to permit the fluid from the blast pipe to enter the casing at right-angles to the coal dust from the feed pipe.

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

JOHN W. ZELL.

Witnesses:

THOMAS C. ^{his} X MATLACK,
mark
C. W. MADER.