(No Model.)

S. W. VALENTINE.

FEEDING FUEL TO BOILERS.

No. 332,975. Patented Dec. 22, 1885.

Fig. 1.

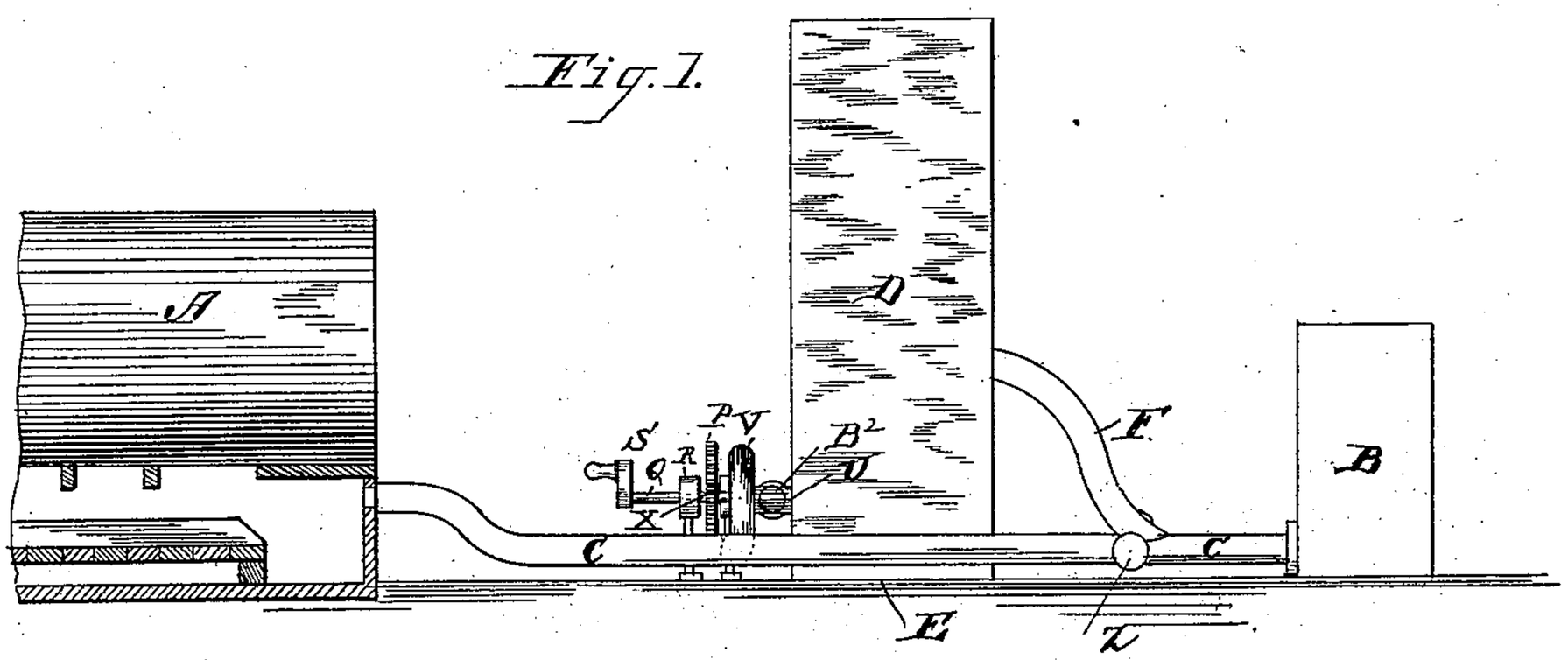


Fig. 2.

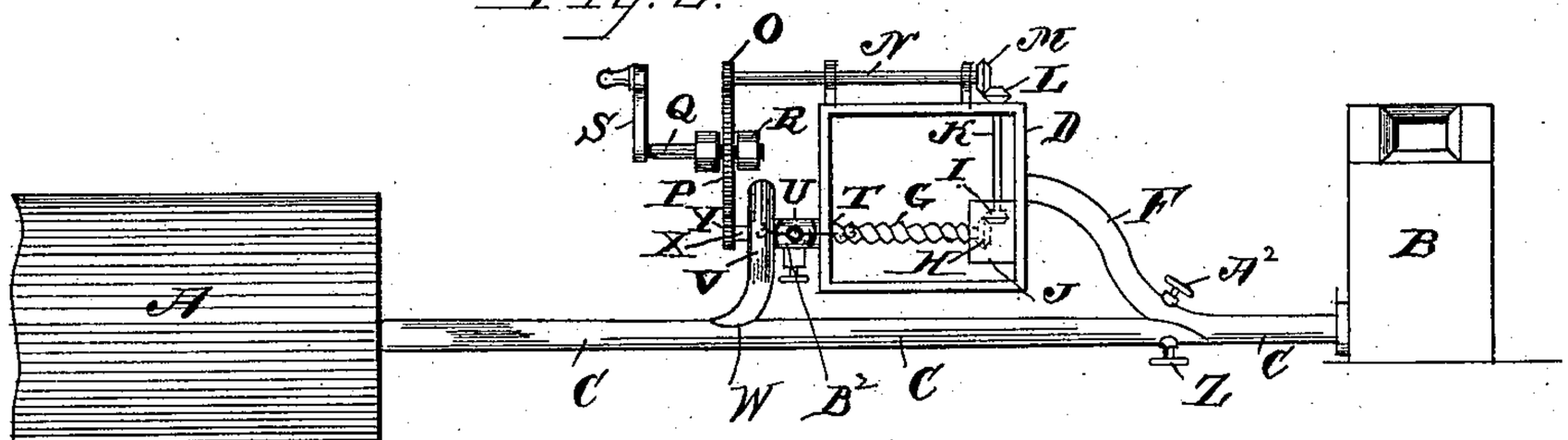
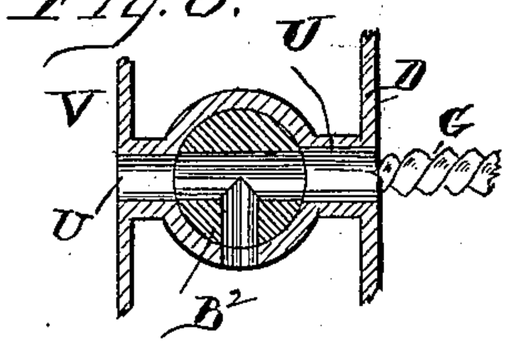


Fig. 3.



Witnesses.
Henry Francis McKeever.
Wm. F. Bellers

Inventor,
Samil W. Valentine,
by Brown Bros.
Attorneys.

UNITED STATES PATENT OFFICE.

SAMUEL W. VALENTINE, OF BOSTON, MASSACHUSETTS.

FEEDING FUEL TO BOILERS.

SPECIFICATION forming part of Letters Patent No. 332,975, dated December 22, 1885.

Application filed April 27, 1885. Serial No. 163,599. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL W. VALENTINE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Feeding Fuel to Boilers, of which the following is a full, clear, and exact description.

This invention pertains to the combustion of coal, tan-bark, and other fuel of finely-comminuted condition, and relates to improvements in apparatus suitable therefor, illustrations of which and of parts of apparatus suitable therefor are to be found in Letters Patent of the United States dated November 13, 1866, May 10 and 31 and November 29, 1870, and February 7, 1871, respectively numbered 59,695, 102,997, 103,695, 103,804, 109,785, and 111,705, and substantially in accordance with the methods of operation described and shown in Letters Patent, original dated March 13, 1866, No. 53,208, and reissue thereof dated March 1, 1870, No. 3,857, and in other Letters Patent to which it is not necessary to particularly refer herein.

This invention consists in the combination, with an apparatus suitable for pulverizing or otherwise reducing coal or other articles of fuel to comminuted condition of sufficient fineness for combustion in a suitable furnace when entered therein, and with means for entering the so-comminuted fuel in conjunction with air into said furnace, to be therein consumed and burned, all substantially as well known and common, as appears from the Letters Patent above directly and indirectly referred to, of a storage bin or receptacle for pulverized or comminuted fuel, and of means for discharging the comminuted fuel which is in said bin, and for entering it in conjunction with air into said furnace, which means are capable of being operated independently and separately from the pulverizing mechanism for pulverizing or comminuting fuel, and from which the so-comminuted fuel is entered directly into said furnace, and all so that the furnace may be supplied with comminuted fuel from the contents of said bin and said supply closed or shut off, substantially as and for the purpose hereinafter described.

This invention also consists in the combination, with an apparatus suitable for pulverizing or otherwise reducing coal or other articles of fuel to a comminuted condition of sufficient fineness for combustion in a suitable furnace, then entered therein, and with means for entering the so-comminuted fuel in conjunction with air into said furnace to be therein consumed and burned, all substantially as well known and common, as appears from the Letters Patent above directly and indirectly referred to, of a storage bin or receptacle for pulverized or comminuted fuel, connected by a suitable way or passage with the said pulverizing mechanism, and mechanism for entering the so-comminuted fuel in conjunction with air into the furnace directly from the pulverizing mechanism, and of means for discharging the comminuted fuel which is in said bin, and for entering it in conjunction with air into said furnace, which means are capable of being operated independently of and separately from the pulverizing mechanism for pulverizing or comminuting fuel, and from which the so-comminuted fuel is entered directly into said furnace, and all so that said storage-bin may be charged or supplied directly from the pulverizing apparatus, and the furnace may be charged or supplied with comminuted fuel from the contents of said bin, and that said supply to or charge of the furnace from said storage-bin and of the storage-bin from the pulverizing mechanism may be opened and closed or shut off, substantially as and for the purpose hereinafter described.

In the drawings the present invention is illustrated.

Figure 1 is a front elevation with the combustion-chamber in vertical section, and shown only at its forward end. Fig. 2 is a plan view of Fig. 1. Fig. 3 is a view in detail, hereinafter referred to.

In the drawings, A represents the furnace, and B an apparatus for pulverizing or otherwise reducing fuel—such as coal, tan-bark, &c.—to a comminuted condition, and of sufficient fineness for combustion within and for entering the so-comminuted fuel in conjunction with air through a suitable way or passage, C, properly connected to the pulverizing apparatus B and the furnace A, and all substantially as well known and as illustrated in the aforesaid Letters Patent, and as neither the furnace A nor the pulverizing apparatus B, nor the mechanism for entering fuel com-

minuted by the pulverizer into the furnace, constitutes of itself any part of this invention, it is not deemed necessary to herein more particularly describe either of them.

D is a bin of any suitable size or shape for the storage of comminuted fuel. This bin D rests upon a floor or other suitable support at E, and, as particularly shown, it is located between the pulverizing mechanism A and furnace B.

F is a branch passage or way, connected at one end to the bin above the bottom thereof, and at the other end to the fuel passage or way C, which leads from the pulverizing apparatus to the furnace and runs in the same direction as that of the travel of the comminuted fuel from the pulverizing apparatus to the furnace. This bin is for the storage of comminuted fuel.

G is a screw-shaft located in the lower portion of the storage-bin below the entrance of the branch way F therein, and arranged to turn in suitable supports or bearings. This screw-shaft G at one end has a bevel gear-wheel, H, meshing with a bevel gear-wheel, I, and both of these gears are within the bin and are incased or boxed, as at J. The bevel gear-wheel I is carried by a horizontal shaft, K, turning in suitable supports or bearings, and extends to the outside of the bin, where it is provided with a bevel gear-wheel, L, which meshes with a bevel gear-wheel, M, of another horizontal shaft, N. The shaft N turns in suitable supports or bearings, and outside of the bin it has a pinion-wheel, O, engaging with a larger gear-wheel, P, of a horizontal shaft, Q, which turns in a standard or support, R, and has a winch or crank handle, S, for convenience in driving it, and thus, through it and the connecting mechanism above described, between it and the screw-shaft G, driving said screw-shaft. The screw-shaft G is for feeding or delivering the comminuted fuel of the storage-bin from said bin, and at its end T it is in communication with a horizontal branch way or passage, U, leading therefrom and opening into a vertical and stationary closed cylindrical shell or casing, V, containing a fan-blower of any of the ordinary constructions, but one suitable to discharge by its rotation from its shell or casing the air supplied to said casing, as hereinafter described, and the comminuted fuel which is fed to it by the rotation of the feed-screw shaft G from the storage-bin through branch or feedway U, leading from the bin through a tangential or peripheral passage, W, of said shell or casing, and which is in communication with the fuel passage or way C, leading from the pulverizing apparatus into the furnace. The fans of the fan-blower are carried by a horizontal shaft, X, which turns in suitable bearings of the shell or casing of the fan-blower, and outside of said shell has a pinion-wheel, Y, meshing with the gear-wheel P of the driving-crank S, all so that by the rotation of the gear-wheel P from the driving-crank S the fan-blower is driven.

Z is a valve located in the fuel way or passage C, leading from the pulverizing apparatus to the furnace, and between the connection of the branch passage or way F thereof, leading to the storage-bin, and which branch way F is provided for conducting the comminuted fuel from the pulverizing apparatus to the storage-bin.

A^2 is a valve in the branch way F, just above referred to, and between main way C and storage-bin, and B^2 is a valve in the branch way U of bin, and which makes communication between said bin and the shell of the fan-blower. The several valves Z, A^2, and B^2 are of any of the ordinary or other constructions and arrangements suitable, by properly turning them, to open and to close the respective ways, Z, F, and U, in which they are located, and the valve B^2, when opened, to establish a passage of air through it and its seat in the branch way U to the fan-blower shell, Fig. 3.

The apparatus above described, except to the combustion of the storage-bin D and apparatus thereof connecting it with the pulverizing apparatus B and the furnace A, and which is to receive comminuted fuel from said pulverizing apparatus, and to discharge it into the furnace to be consumed therein, is, as before stated, in substance the same, as is well known, and their operations and use, considered of themselves, are the same as ordinary, and therefore they need no particular description; but with a storage-bin and its apparatus and connections described combined therewith, and the discharge of said bin capable, as has been described, of separate and independent operation, the furnace can be charged or furnished with comminuted fuel, as may be desired, independently of and separately from the furnishing and charging thereof with such fuel in the ordinary way, and consequently an apparatus is produced which is capable of supplying the furnace with comminuted fuel, and in a manner independently of and separately from the feed of said furnace, with comminuted fuel secured under the operation of the power generated by the furnace itself, and which, as such apparatuses have been heretofore used, has been the only means for a feed of the furnace with comminuted fuel, and which means only could be employed when sufficient power has been generated from the combustion in the furnace therefor.

To use the storage-bin and its operating mechanism for feeding the furnace therefrom with comminuted fuel, as above described, the valve Z A^2 of the fuelways C F, leading from the pulverizer to the furnace and from the fuelway C to the bin, must be closed and the valve B^2 of the fuelway U, leading from the bin to the fan-blower shell, opened. Again, to supply the bin with the comminuted fuel produced from the pulverizing apparatus, the valve Z of the fuelway C, leading from said apparatus

to the furnace, and the valve B^2 of the fuelway U, leading from the bin to the fan-blower shell, must be closed, and the valve A^2 of the branch fuelway F, leading from the fuelway C of the pulverizer to the bin, opened; and again, for a feed of the furnace with comminuted fuel from the pulverizing apparatus, the valves A^2 B^2 of both of the branch ways F U, connected to the bin, must be closed.

The connection between the storage-bin and the pulverizing apparatus may be dispensed with and the bin charged independently thereof; but it is best to directly connect the bin and pulverizing apparatus, as described.

The storage-bin may be connected directly with the furnace in lieu of through the fuelway C, connecting the pulverizing apparatus with the furnace.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination, an apparatus suitable to pulverize or otherwise reduce fuel to a comminuted condition, a furnace suitable for combustion of comminuted fuel directly connected with each other, and a storage-bin connected to said pulverizing apparatus and said furnace and provided with means suitable to enter its contents into said furnace, all substantially as and for operation and purposes described.

2. In apparatuses adapted for pulverizing or otherwise reducing fuel to a comminuted condition and entering the so-comminuted fuel into the combustion-chamber therefor of the apparatus, a storage-bin for comminuted fuel connected by a fuelway with the combustion-chamber or furnace of the apparatus, and provided with a feed and fan-blower mechanism adapted to enter its fuel into said combustion-chamber through said fuelway, in combination with a valve of said fuelway adapted to open and to close the same, substantially as described, for the purpose specified.

3. In apparatuses adapted for pulverizing or otherwise reducing fuel to a comminuted condition and entering the so-comminuted fuel into the combustion-chamber therefor of the apparatus, a storage-bin for comminuted fuel connected by a fuelway, F, with the pulverizing mechanism and by a fuelway, U V, with the combustion-chamber or furnace of the apparatus, and provided with a feed and fan-blower mechanism adapted to enter its fuel into said combustion-chamber through said fuelway U V, in combination with a fuelway, C, connecting said pulverizing mechanism and said furnace or combustion-chamber, and with valves Z, A^2, and B^2 in said fuelway, substantially as described, for the purpose specified.

4. In apparatuses adapted for pulverizing or otherwise reducing fuel to a comminuted condition and entering the so-comminuted fuel into the combustion-chamber therefor of the apparatus, a storage-bin, D, for comminuted fuel connected by fuelways F U V with a fuelway, C, connecting pulverizing mechanism with furnace or combustion-chamber, and provided with a feed and fan-blower mechanism adapted to enter the fuel of the bin into said combustion-chamber or furnace, in combination with valves Z, A^2, and B^2 in said fuelways, substantially as described, for the purposes specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

SAMUEL W. VALENTINE.

Witnesses:
ALBERT W. BROWN,
WM. S. BELLOWS.