No. 740,097. PATENTED SEPT. 29, 1903.

L. K. DAVIS.

FUEL FEEDING APPARATUS.

APPLICATION FILED JAN. 14, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1

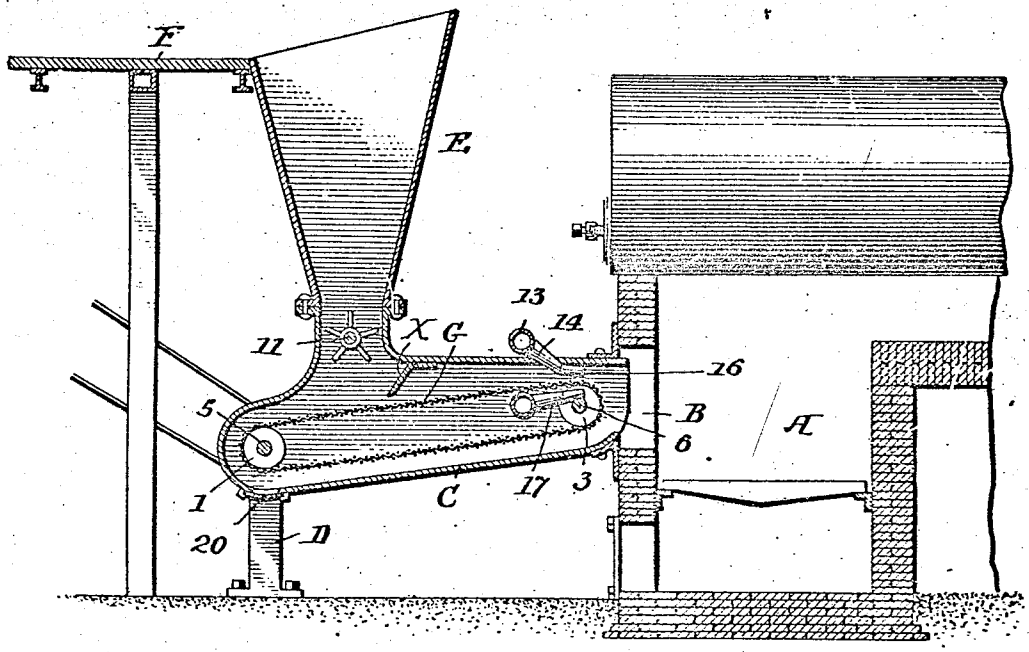
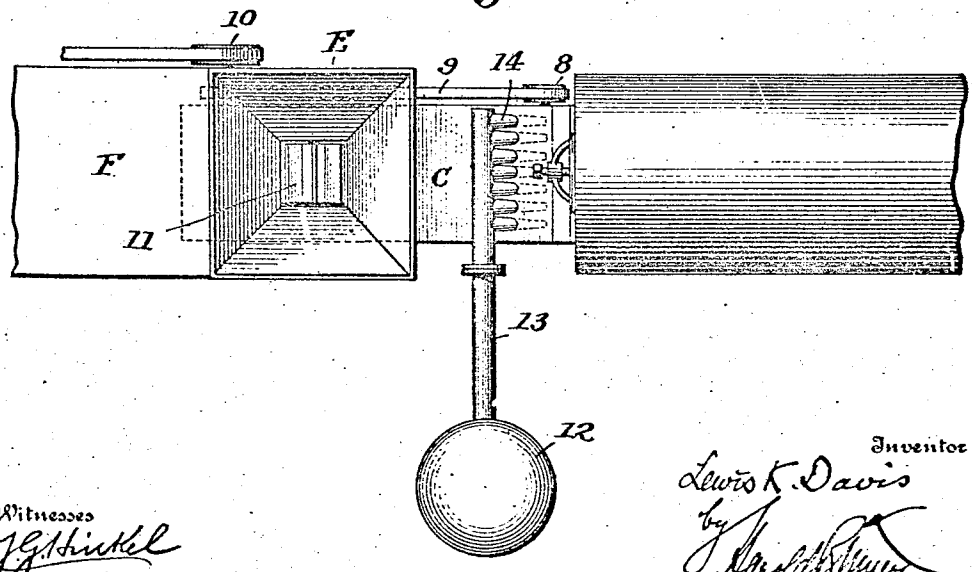


Fig. 2.



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FUEL FEEDING APPARATUS.

APPLICATION FILED JAN. 14, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

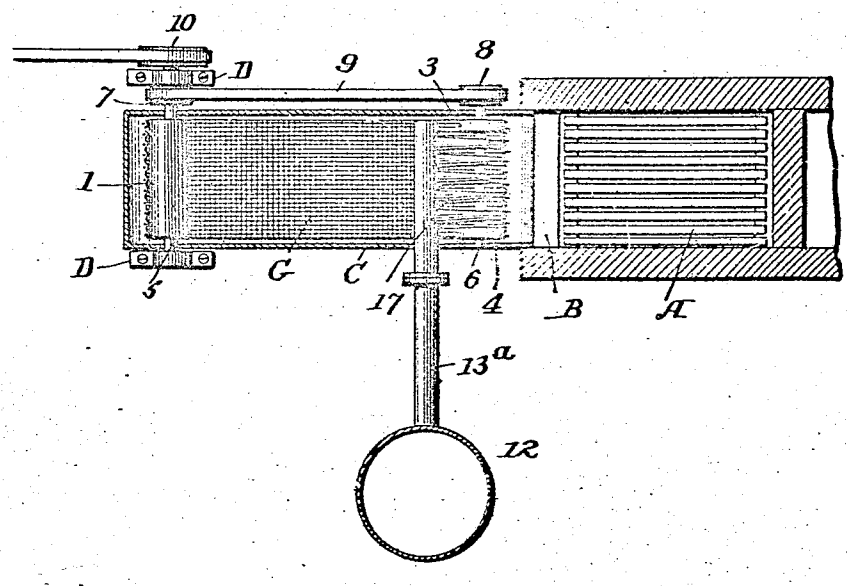
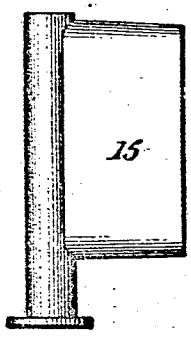


Fig. 4.



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No. 740,097. Patented September 29, 1903.

UNITED STATES PATENT OFFICE.

LEWIS K. DAVIS, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO GRACE P. DAVIS, OF INDIANAPOLIS, INDIANA.

FUEL-FEEDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 740,097, dated September 29, 1903.

Application filed January 14, 1902. Serial No. 89,721. (No model.)

To all whom it may concern:

Be it known that I, LEWIS K. DAVIS, of Indianapolis, Indiana, have invented certain new and useful Improvements in Fuel-Feeding Apparatus, of which the following is a specification.

My invention relates to fuel-feeding apparatus for furnaces, but more particularly to apparatus for continuously feeding fine fuel, as coal or coke, coal-dust, and the like.

The object of my invention is to improve upon the apparatus hitherto employed for forcing fuel into a furnace and distributing it therein through the agency of fluid under pressure, as air or steam, acting upon the fuel as it is continuously conveyed to the furnace-entrance.

It has hitherto been customary to either arrange a fluid-jet, as of air, steam, or the like, at the furnace-entrance beneath the mouth of the conveyer which continuously delivers fuel to the furnace, thus forcing the fuel into the furnace directly or carrying it in by suction, or else the fuel has been conveyed into a blower of suitable character, and thus blown into the furnace. In these cases it is difficult to obtain an even distribution of the fuel on the furnace-bed, for the layer of fuel is apt to become thicker in some parts than in others. Also one of the objects of thus utilizing a fluid-jet is to mingle the fuel with oxygen-containing fluid in order to increase combustion, and it is customary to provide mixing-chambers in connection with the apparatus to thoroughly commingle the fuel and oxygen-containing fluid before introducing the fuel into the furnace.

My invention consists, primarily, in so arranging the means for supplying fluid under pressure at the furnace-entrance to carry the fuel as it is delivered to the furnace into the same that an even distribution of the fuel is obtained in the furnace and a thorough commingling of the fuel and oxygen-containing fluid is secured without the necessity of using an auxiliary mixer.

I have found that by forcing fluid, as air or steam, upon the fuel at the furnace-entrance from different directions as the fuel is conveyed to the furnace these results are accomplished; also, by forcing the fluid into the furnace by any suitable means and then conveying the fuel beneath said entering fluid the fuel is carried into the furnace by the action of the fluid and distributed in a substantially even layer.

My invention further consists in the apparatus and construction of parts hereinafter more fully described and shown in the accompanying specification and drawings, in which—

Figure 1 is a side view of my improved apparatus, partly in section. Fig. 2 is a plan of the same. Fig. 3 is a plan view, partly in section, with the upper portion of the conveyer removed. Fig. 4 is a detail of a modified form of nozzle.

Referring to the drawings, A represents a suitable furnace in connection with which my improved fuel-feeding apparatus is shown, in this instance arranged in front of the furnace, but it may of course be arranged in any desired position relative to the fuanace, as at the side.

B represents the entrance of the furnace, in front of which is suitably supported a casing C, as shown, supported at one end on the furnace and at the other upon pillars D.

The casing C is preferably provided with a hopper E for supplying fuel to the fuel-feeding apparatus, the hopper being shown extending upward to a platform F, by which it may be partially supported.

Any suitable means may be provided within the casing C for continuously delivering fuel to the entrance of the furnace; but I prefer the means shown, consisting of a traveling band, in this instance a band in the form of a traveling screen G, carried upon rollers arranged transversely in the casing C. The roller 1 at the rear of the screen G may be cylindrical with a continuous periphery, as shown; but the forward portion of the screen is preferably supported upon rollers 3 4, having a space between the same, the object of which will hereinafter appear. The roller 1 and rollers 3 4 are provided with axles 5 6, the axle 5 being suitably journaled, as in the pillars D, while the axle 6 is shown as journaled in the casing C, and means are provided for rotating the rollers 1 and 3 4, a convenient means being the pulleys 7 8, connected by a

belt 9, another pulley 10 being shown on the same shaft 5 with pulley 7 and connected to be driven from any suitable source of power.

Preferably the axles 5 and 6 are at different levels, as shown, the rear axle 5 being lower than the axle 6, so that the traveling screen G has a slant backward from the entrance of the furnace, the highest point being adjacent the furnace-entrance.

Means are provided, as a feeder or agitator 11, within the hopper E for regularly feeding the fuel to the screen G to be conveyed to the furnace. Means are then provided adjacent the end of the conveyer nearest the furnace for supplying fluid under pressure to carry the fuel into the furnace and distribute it therein.

12 represents a source of supply of fluid under pressure, as air or steam, and pipes 13 and 13^a are provided for leading the fluid from the source to a point above the portion of the conveyer G nearest the furnace. As shown, the fluid is led through a series of nozzles 14, preferably extending across the furnace-entrance and arranged with their orifices 16 above the highest point of the conveyer G, so that the fluid as it passes into the furnace carries the fuel with it and deposits the fuel on the furnace-bed. The action of this jet 14 is rather to blow the fuel downward than upward, and because of the backward slant of the conveyer or screen G the supply of fuel is regulated and the suction of the jet does not tend to clog the space between the screen and jet. Another series of nozzles 17 are arranged to force liquid through the screen and carry the fuel into the furnace. As shown, these nozzles 17 are arranged within the upper and lower portions of the screen and between rollers 3 4, so that the fluid may pass through the screen. These nozzles 14 and 17, at angles to each other, serve to thoroughly commingle the fuel and air or steam, for their directions of discharge intersect, the nozzles 17 blowing directly through the fuel and forcing it in an upward direction into the line of discharge of the nozzles 14, the effective action of which latter nozzles is more in the nature of suction. The combined action of the two sets of nozzles secures even distribution and thorough commingling of fluid and fuel.

It will be seen that without the action of the fluid, or, in other words, with a traveling conveyer or screen G alone arranged, as shown, no fuel would be fed into the furnace, because the portion of the screen nearest the furnace is at such a distance therefrom that the fuel would simply drop down into the casing C, so that the fuel is delivered to the furnace by the conveyer, but carried into the same by the action of the fluid under pressure.

In order to remove any fuel which may collect in the casing C, a door 20 is provided therein. Instead of the series of nozzles 14 and 17 a continuous nozzle 15, as shown in Fig. 4, might be used in place of either or both of these.

In order to secure an even layer of substantially uniform thickness on the conveyer, a spreading-plate X is provided, supported from the casing C, as shown, and this plate may have a serrated edge, like a comb.

Without limiting myself to the precise details of construction shown and described, I claim—

1. In an apparatus for feeding fuel, the combination with a furnace, of means for conveying a layer of fine fuel thereto, and means for forcing fluid upon said fuel while upon the conveyer to carry it into the furnace, substantially as described.

2. In an apparatus for feeding fuel, the combination with a furnace, of means for continuously conveying a layer of fine fuel thereto and means for supplying fluid under pressure from different directions to mix with the fuel and to distribute the same in the furnace, substantially as described.

3. In an apparatus for feeding fuel, the combination with a furnace, of means for continuously conveying a layer of fine fuel thereto, and means for forcing fluid into the furnace above said fuel upon the conveyer to carry the same into the furnace, substantially as described.

4. In an apparatus for feeding fuel, the combination with a furnace, of means for continuously conveying a layer of fine fuel to the entrance of the furnace, and means for mixing fluid under pressure with said fuel from different directions at the entrance of the furnace, substantially as described.

5. In an apparatus for feeding fuel, the combination with a furnace, of means for continuously conveying fuel thereto and means for forcing fluid upon said fuel while upon the conveyer from at least two different directions to carry the fuel into the furnace and distribute it therein, substantially as described.

6. In an apparatus for feeding fuel, the combination with a furnace, of a conveyer for continuously delivering a layer of fine fuel to the entrance thereto and means arranged above the conveyer for supplying fluid under pressure to carry the fuel from the conveyer into the furnace, substantially as described.

7. In an apparatus for feeding fuel, the combination with a furnace, of a traveling screen for conveying fuel to the furnace, and means for forcing fluid through said screen to distribute the fuel in the furnace, substantially as described.

8. In an apparatus for feeding fuel, the combination with a furnace, of a traveling screen for conveying fuel to the furnace, means for forcing fluid into the furnace from above the fuel on the traveling screen, and means for forcing fluid through said screen and into the fuel, to distribute the fuel in the furnace, substantially as described.

9. In an apparatus for feeding fuel, the com-

bination with a furnace, of a traveling screen conveyer and means for operating the same, for delivering fuel to the furnace, and means for distributing the fuel in the furnace from said screen by the action of fluid under pressure upon the fuel while upon the screen, substantially as described.

10. In an apparatus for feeding fuel, the combination with a furnace, of a traveling band and means for operating the same, for conveying fuel to the furnace, and means acting upon the fuel on the band for carrying the fuel from said traveling band into the furnace by the action of fluid under pressure, substantially as described.

11. In an apparatus for feeding fuel, the combination with a furnace, of a conveyer for delivering fuel to the furnace-entrance, and means for carrying the fuel from the conveyer into the furnace consisting of fluid-jets arranged above and below the conveyer at the furnace-entrance in angular relation to each other so that their directions of discharge intersect, substantially as described.

12. In an apparatus for feeding fuel, the combination with a furnace, of a conveyer for delivering fuel to the furnace-entrance, and means for carrying the fuel from the conveyer into the furnace, consisting of fluid-jets arranged at the furnace-entrance in angular relation to each other so that their directions of discharge intersect, substantially as described.

13. In an apparatus for feeding fuel, the combination with a furnace, of a conveyer for delivering fuel to the furnace-entrance, and means for carrying the fuel from the conveyer into the furnace, consisting of fluid-jets arranged above and below the conveyer at the furnace-entrance, substantially as described.

14. In an apparatus for feeding fuel, the combination with a furnace, and a conveyer for delivering fuel to the furnace-entrance of a fluid-jet for forcing the fuel from the conveyer and another fluid-jet arranged to act upon the fuel so forced from the conveyer and distribute said fuel in the furnace, substantially as described.

15. In an apparatus for feeding fuel, the combination with a furnace, of a traveling screen conveyer for delivering fuel to the entrance of the furnace, a fluid-jet arranged above said conveyer for carrying the fuel into the furnace and another fluid-jet arranged within the upper and lower portions of the screen also for carrying the fuel into the furnace, substantially as described.

16. In an apparatus for feeding fuel, the combination with a furnace, of fuel-conveying mechanism, means for distributing material in a layer thereon, and means for forcing fluid upon said fuel while upon the conveyer to carry it into the furnace, substantially as described.

Signed this 2d day of January, 1901, at Indianapolis, Indiana.

LEWIS K. DAVIS.

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