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APPARATUS FOR FEEDING PULVERIZED FUEL.

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1,197,908. Patented Sept. 12, 1916.

Fig: 1.

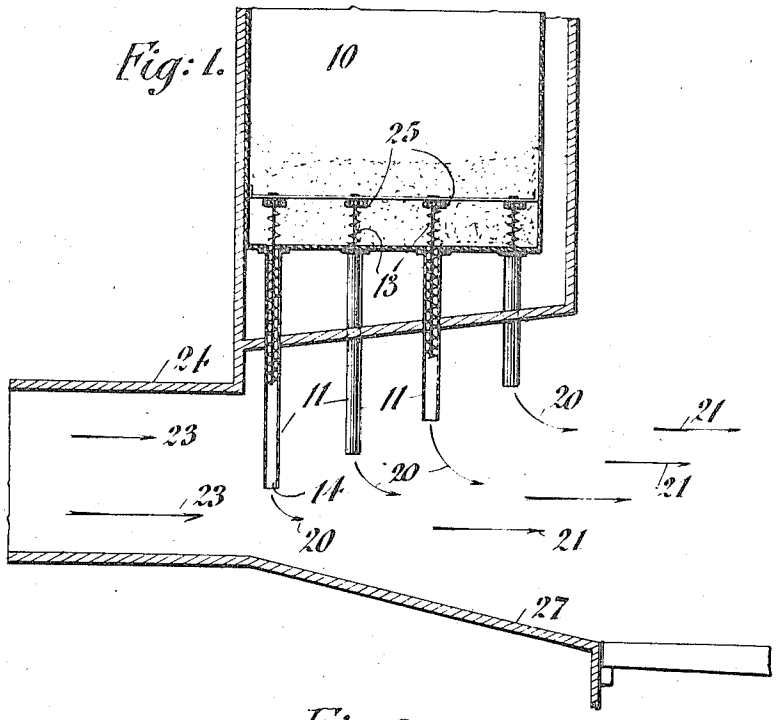
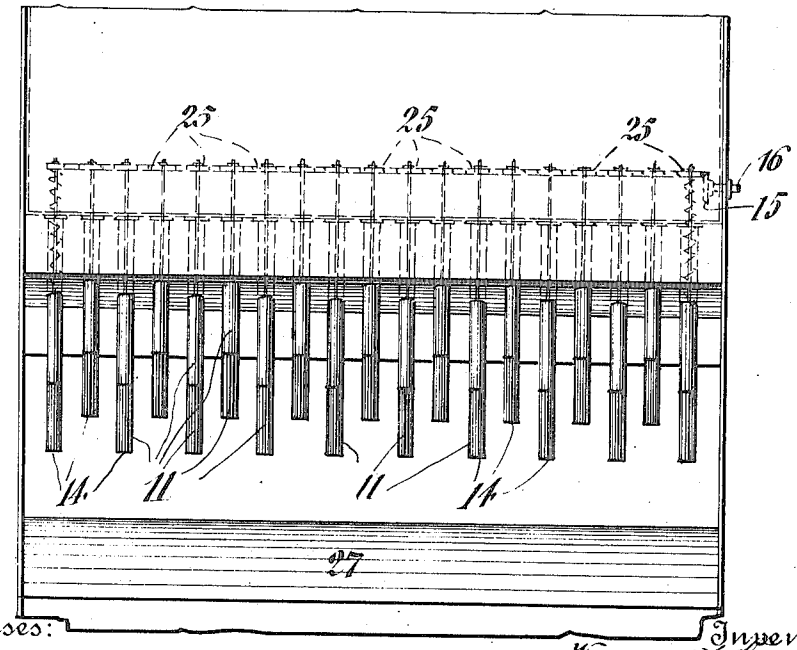


Fig: 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR FEEDING PULVERIZED FUEL.

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Application filed October 4, 1913, Serial No. 793,310. Renewed July 29, 1916. Serial No. 112,132.

To all whom it may concern:

Be it known that I, VIRGINIUS Z. CARACRISTI, a citizen of the United States of America, and resident of Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Apparatus for Feeding Pulverized Fuel, of which the following is a specification.

This invention relates to apparatus for feeding pulverized fuel, and the object of the invention is to devise an apparatus for feeding pulverized fuel being specially adapted for use with reference to steam-boilers and furnaces.

Another object of the invention is to provide a short but intense flame, and do away with any blow-pipe action, which is the result of injecting the fuel and air at a high initial velocity.

The invention will be further described hereinafter and finally pointed out in the claims.

In the accompanying drawings, which show an embodiment of my invention, Figure 1 is a vertical longitudinal section through the apparatus, and Fig. 2 is a partial end-elevation of the same.

Similar reference characters indicate corresponding parts in the views.

Referring to the drawings, the fuel-container 10 is provided with a quantity of powdered fuel and has feeding devices 11 for the pulverized fuel at the lower part thereof. These feeding devices consist of vertically-arranged tubes, one next to the other, and having their ends of different elevations. Each of these tubes is provided with a feeding orifice 14, and within the tubes are arranged helical or screw feeding devices 13. These screws have at their upper ends gear-wheels 25 which mesh with each other, so as to have one gear-wheel rotate the adjacent one. The end gear-wheel meshes with another gear-wheel 15 having a shaft 16, which is driven by suitable driving mechanism. Thus by the driving of the shaft 16 with its gear-wheel 15, all the gear-wheels 25 are rotated, and thereby the helical feeding members 13 within the tubes 11 are rotated and cause the fuel within the container 10 to be fed by the screws through the tubes 11 and out of the lower orifices 14 thereof. The air intended to be combined with this fuel to cause its combustion is forced in at the portion 24, in the direction of the arrows 23, and this current of air strikes the downwardly-flowing finely-divided fuel and forces the same, in the manner shown by the arrows 20, into the current of combined fuel and air, as indicated by the arrows 21. With the combined mixture of air containing oxygen and finely-divided fuel in the manner indicated by the step-shaped feeding device, as shown in Fig. 1, in the bank or plurality of tubes, shown in Fig. 2, a very-finely divided and intimate combination of fuel and oxygen takes place, which is fed in this combined state into the furnace. Of course, instead of the screws described, any other suitable conveying or feeding means can be provided so as to bring about an intimate mixture. The air entering the member 24 may be by means of a draft caused by the combustion or by suitable mechanical means; the important feature, however, being that this air-current should not be of great velocity; the object of the invention being to provide means by which fuel is fed into the mixing chamber in a finely-divided condition, by reason of which finely-divided condition the fuel can be conveyed by a current of air of low velocity into the part of the furnace in which combustion takes place, the fuel being there brought to the ignition point. The arrangement of the air-current in the feeding orifices will cause the feeding orifices to remain cool and prevent them from being choked by the direct action of the heat. The box 27 may be widened toward the place where the combustion takes place, so that the air-current, after being mixed with the pulverized fuel, may be lowered in velocity and prevent a flame of the character of a blow-pipe. The air current will increase in cross-section as it passes through the tapering box 27, so that eddies at right angles to its movement will be produced.

I have shown one embodiment of my invention, but it is clear that changes may be made therein without departing from the spirit of the invention as defined in the appended claims.

What I desire to claim by Letters Patent is the following:

1. In a burner for pulverized fuel, a partially inclosed combustion space for burning the fuel, a second partially inclosed space connected therewith, means in and throughout said second partially inclosed space for feeding a current of fuel into said second partially inclosed space, means for passing

a current of air into said second inclosed space, and out therefrom into the combustion space, said current of air supplying substantially sufficient oxygen to said second inclosed space to cause complete combustion of the fuel carried along thereby, and means for spreading said current of fuel substantially uniformly over the cross-section of said current and in a direction across the current, until the mingled current of air and fuel passes out of said second inclosed space.

2. In a burner for pulverized fuel, a partially inclosed combustion space for burning the fuel, a second partially inclosed space connected therewith, means for feeding the fuel into the second partially inclosed space in a plurality of streams, an independent means for passing a current of air across said streams of fuel consecutively, before said fuel enters the said combustion space, said air and fuel being intermingled before passing into said combustion space.

3. In a burner for pulverized fuel, a partially inclosed combustion space for burning the fuel, a second partially inclosed space connected therewith, a plurality of feed-tubes for feeding the fuel projecting into the second partially inclosed space, the portions of said feed-tubes projecting into said second inclosed space being of unequal length, and means for directing a current of air across the mouths of said feed-tubes, and beyond their orifices and into the inclosed combustion space.

4. In a burner for pulverized fuel, a partially inclosed combustion space for burning the fuel, a second partially inclosed space connected therewith, feed-tubes in and throughout said second partially inclosed space for feeding the fuel into the second partially inclosed space, the mouths of said feed-tubes being uniformly spaced from each other, and means for directing a current of air from the second partially inclosed space, and across the streams of fuel emerging from said tubes, into the partially inclosed combustion space.

5. In a burner for pulverized fuel, a partially inclosed space of progressively increasing size, means for feeding fuel in separate currents to the partially inclosed space, along the length of it, means for injecting a current of air into the partially inclosed space at the smaller end of the said space for mixing the air with the fuel as it is fed to said partially inclosed space in separate currents, and a partially inclosed combustion space at the larger end of the first named space, for receiving the intermingled current of fuel and air, the velocity of the said current of fuel and air being less than the velocity of the current of air at the entering end of the said second partially inclosed space.

6. In a burner for pulverized fuel, a partially inclosed combustion space for burning the fuel, a second partially inclosed space for mixing the fuel with air from the atmosphere, while it has a temperature below the ignition point, means for feeding a plurality of streams of fuel into said second inclosed space, means for feeding a current of air across said plurality of streams of fuel, and means in said second inclosed space for dividing a portion of the stream of air into a plurality of streams of air and simultaneously giving to a portion of the air movements at right angles to the main direction of the flow of the air whereby said currents of fuel and air are thoroughly intermingled.

7. In a burner for pulverized fuel, a partially inclosed combustion space for burning the fuel, a second partially inclosed space for mixing the fuel with air taken from the atmosphere, and having a temperature below the ignition point, a plurality of means for feeding fuel into said second inclosed space, means for feeding a current of air across said fuel, and means in said inclosed space for splitting a portion of the current of air into a plurality of individual streams, and simultaneously imparting at the point of impingement of the portion of the air current, movements angularly to the direction of flow.

8. In a fuel burner, a partially inclosed combustion space for burning the fuel, a second partially inclosed space for mixing the fuel with air, a series of spaced fuel feeding-tubes in and throughout said second partially inclosed space, and an air inlet passage for admitting air from the atmosphere at one end of said second partially inclosed space, said second partially inclosed space being enlarged away from said inlet passage toward an outlet passage to a partially inclosed space for burning the fuel, whereby the velocity of the intermingled current of fuel and air entering said combustion space is less than the current of air entering from the atmosphere.

9. In a burner for pulverized fuel, a partially inclosed space for burning the fuel, a second partially inclosed space connected therewith, said second partially inclosed space having diverging walls toward the first space, and a plurality of feed tubes spaced apart along the width of the second space, and arranged in rows along the length of the second space, and having the orifices of the first row lowermost, and the orifices of each succeeding row successively higher, until the shortest last row, the gradual shortening of the feed tubes corresponding with the gradual diverging increase of the second space.

10. In a burner for pulverized fuel, a partially inclosed space having diverging walls, a plurality of feed tubes arranged in a row

across the width of the said inclosed space, the orifices of said row of feed tubes extending in proximity to the lowermost wall of the partially inclosed space, a plurality of rows of feed tubes arranged behind the first row and extending across the width of the inclosed space, the second row of feed tubes having their orifices a greater distance from the lowermost wall than the first row, and the third row having their orifices at a greater distance from the lowermost wall than the second row, and the fourth row having their orifices at a greater distance than the third row, so that the innermost row, at the widest part of the inclosed space, has the greatest distance from the lowermost wall, and an air feeding member at the narrowest portion of the inclosed space.

11. In a burner for pulverized fuel, an air feeding member, a mixing member having top and bottom walls diverging from the air feeding member, and a plurality of rows of feed tubes arranged across the width of the mixing member and along the length thereof, the first row across the width extending lowermost, the following rows across the width being each shorter than the other, so that the last row across the width has the greatest distance from the lowermost wall of the mixing member, the feed tubes forming the rows along the length of the mixing member being in line with each other.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

VIRGINIUS Z. CARACRISTI.

Witnesses:
F. Hogg,
F. Fisk.