W. R. DUNN.

POWDERED FUEL FEEDING APPARATUS.

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1,028,997.

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FIG. 1.

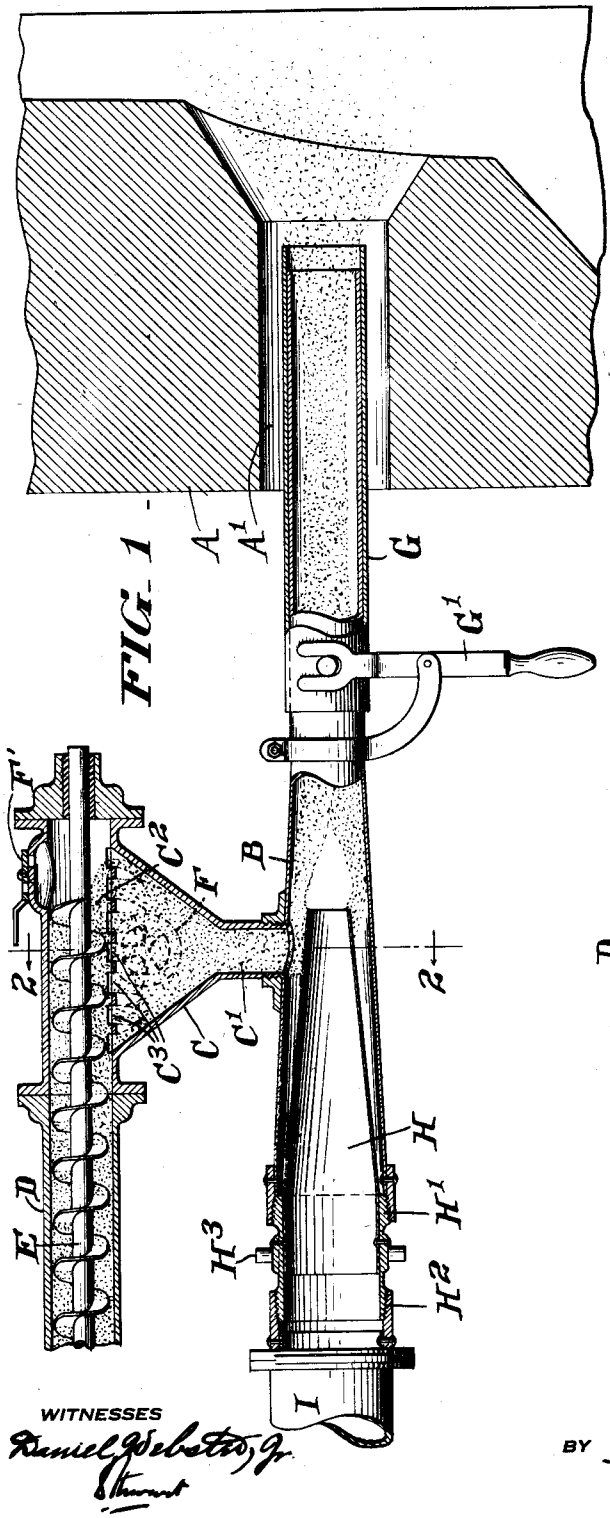
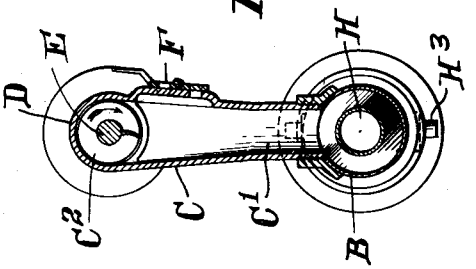


FIG. 2.



WITNESSES

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POWDERED-FUEL-FEEDING APPARATUS.

1,028,997. Specification of Letters Patent. Patented June 11, 1912.

Application filed July 26, 1911. Serial No. 640,668.

To all whom it may concern:

Be it known that I, WILLIAM R. DUNN, a citizen of the United States of America, residing in Easton, in the county of Northampton, in the State of Pennsylvania, have invented certain new and useful Improvements in Powdered Fuel-Feeding Apparatus, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My present invention relates to means for feeding pulverized coal into the combustion chamber of furnaces or kilns of the kind in which an air blast is employed to blow the coal into the combustion chamber.

The general object of the invention is to provide apparatus for the purpose specified which is simple and effective and capable of adjustment to insure a fuel feed of the desired uniformity notwithstanding the variations in conditions experienced in the practical use of such apparatus. The varying factors which affect the supply of the coal and air fuel admixture include the fineness of the coal, the moisture in the coal and in the air admixed with it, the atmospheric pressure, the stack pressure and the blast supply pressure.

More specifically, the present invention is in the nature of an improvement on the apparatus disclosed and claimed in my prior Patent No. 954,944, granted April 12, 1910, devised and adapted to increase the utility of the apparatus disclosed by my prior patent, as explained in connection with the accompanying drawings and descriptive matter in which I have illustrated and described one form of apparatus embodying the present invention.

Of the drawings, Figure 1 is an elevation partly in section of so much of a fuel feeding apparatus as is necessary for an understanding of the present invention. Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1.

In the drawings, A represents the end wall of the combustion chamber of a cement kiln or other furnace into which powdered fuel admixed with air is discharged, and in which combustion of the admixture takes place.

A′ represents the port or passageway in the end wall A into which the blast chamber or conduit B, or an extension thereof, projects. Above the blast conduit or chamber B is located a second chamber C connected at its lower end to the blast conduit by the port or passageway C′. At its upper end the chamber C is provided with a tubular wall portion C^2 which forms an extension of the casing D surrounding a conveyer screw E, by means of which powdered fuel is fed from a suitable source of supply into the upper end of the chamber C through the ports C^3 formed in the tubular wall C^2. These ports are so arranged that the aggregate port area, so to speak, through which the coal is discharged into the upper end of the chamber C is distributed longitudinally and restricted circumferentially of the screw conveyer and the powdered fuel is consequently discharged into the chamber C in fine distributed streams.

F and F′ represent dampers controlling ports through which a restricted supply of atmospheric air is permitted to pass into the chamber C.

In so far as above described the apparatus disclosed is essentially the same as that disclosed in my prior patent referred to.

In addition to the ports already referred to, the apparatus includes a telescopic extension G for the discharge end of the blast nozzle B and a lever G′ for adjusting this extension, and an air blast nozzle H opening into the blast pipe or chamber B. The features just referred to are not in themselves peculiar to the present invention, but an essential characteristic of the invention claimed herein is found in the fact that the nozzle H is axially adjustable to thereby vary the eductive action of the blast issuing from it on the chamber C. As shown the nozzle H comprises a conical discharge end portion entering the pipe or chamber B and terminating in proximity to, and preferably as shown, slightly in advance of the port C′. The member H comprises also a cylindrical body portion which is in threaded engagement at H′ with the chamber or conduit B and is in threaded engagement at H^2 with the supplying air under pressure conduit I for the blast. The conduit I is spaced away from, but connected to the blast conduit B by the body portion of the blast nozzle. Between the adjacent ends of the conduits B and I the nozzle is provided advantageously with projections H^3 forming handles by means of which the nozzle member H may be rotated to thereby adjust its discharge end axially in the blast conduit B.

On account of the more or less flocculent nature of the powdered fuel, the coal particles tend to separate from one another as they pass through the chamber C. The coal particles are to some extent held in suspension or rather retarded during their passage through the chamber C by the air in the chamber. To regulate the dispersion effect obtained in the chamber C it is essential to regulate the air pressure in that chamber. This involves a restricted admission of air to the chamber C and advantageously a regulation of this restricted admission of air, such as is obtained by adjusting the dampers or air admission valves F and F′ is required. I have found, however, that something more than a mere adjustment in the dampers or valves through which air is supplied to the chamber C is required in order to obtain the desired uniformity of supply of the powdered fuel and the desired admixture thereof with air under all varying conditions met in practice. The additional feature which I have found necessary for the best results consists in means for regulating the pressure in the chamber C independently of, or in addition to the regulation had by adjusting the dampers F and F′. This I accomplish with the apparatus shown by axially adjusting the blast nozzle H to thereby vary the eductive effect on the chamber C exerted by the blast discharged from the blast nozzle H. By a suitable adjustment of the axial position of the blast nozzle H and of the dampers F and F′ it is possible to raise or lower the pressure in the chamber C either with or without varying the total weight or proportion of air and coal issuing at any instant from the discharge end of the blast nozzle B.

The practical use of the improved apparatus has demonstrated that the increased capacity for adjustment obtainable with it adds appreciably to the value of the fuel feeding apparatus disclosed in my prior patent.

While in accordance with the provisions of the statutes I have illustrated and described the best form of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of my invention, and that under some conditions it may be of advantage to use certain features of the invention without a corresponding use of the others.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. Mechanism for blowing powdered coal into a combustion chamber comprising in combination an air blast chamber, a second chamber provided with a port at its lower end opening to said blast chamber, means for effecting a distributed feed of powdered coal into said second chamber above the lower end thereof and provisions for supplying air to said second chamber at a rate which is regulable independently of the rate at which the powdered coal is supplied thereto, and a blast nozzle extending into said blast chamber with its discharge end in proximity to said port and adjustable with respect thereto to vary the eductive effect on said second chamber of the blast discharged from said nozzle.

2. Mechanism for blowing powdered coal into a combustion chamber comprising in combination an air blast conduit, a chamber provided with a port at its lower end opening to said conduit, means for effecting a distributed feed of powdered coal into said chamber above its lower end and provisions for supplying air to said chamber at a rate which is regulable independently of the rate at which the powdered coal is supplied thereto, and a blast nozzle extending into said blast conduit with its discharge end located in advance of said port, said blast nozzle being axially adjustable to vary the eductive effect on said chamber of the blast discharged from said nozzle.

3. Mechanism for blowing powdered coal into a combustion chamber comprising in combination an air blast conduit, a chamber provided with a port at its lower end opening to said blast conduit, means for effecting a distributed feed of powdered coal into said chamber above its lower end and provisions for supplying air to said chamber at a rate which is regulable independently of the rate at which the powdered coal is supplied thereto, a conduit supplying air under pressure for the blast in line with but separate from said blast conduit, and a blast nozzle member comprising a discharge end projecting into said blast conduit in proximity to and slightly in advance of said port and a body portion connecting and in threaded engagement with said blast and air supply conduits, said threaded engagement permitting of an axial adjustment of the discharge end of the blast nozzle to thereby vary the eductive effect on said chamber of the blast discharged from the said blast nozzle.

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Witnesses:
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