W. R. DUNN.

MECHANISM FOR FEEDING PULVERIZED COAL.

APPLICATION FILED APR. 9, 1909.

954,944.

Patented Apr. 12, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

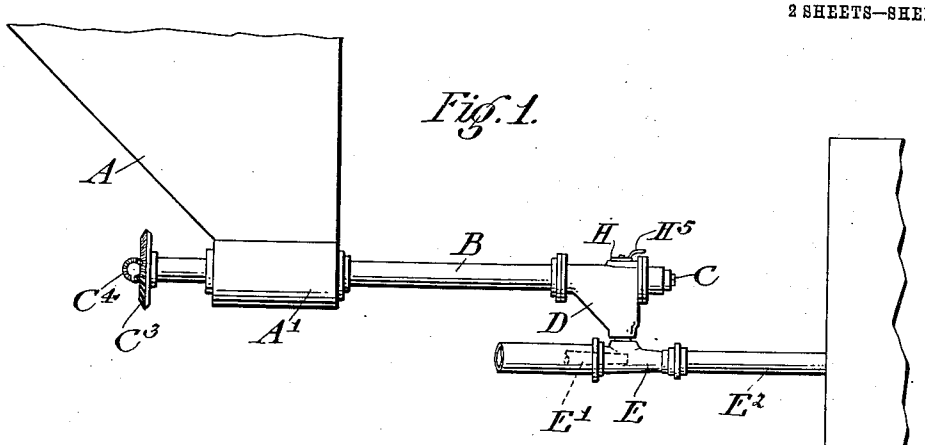
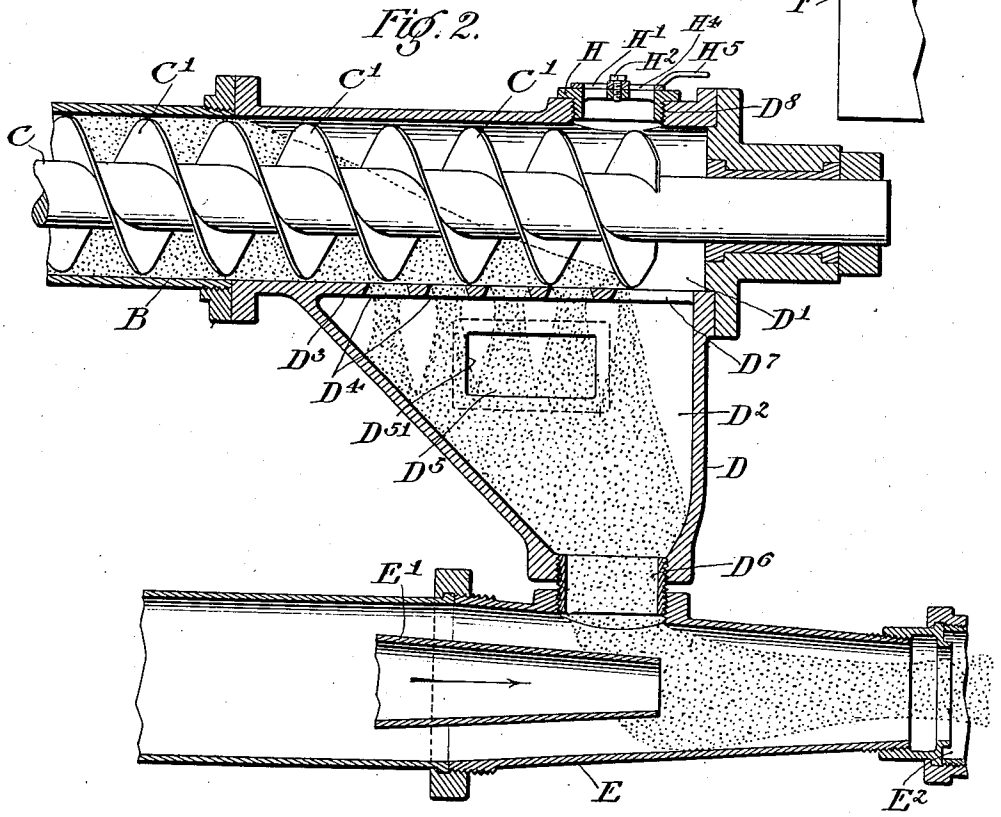


Fig. 2.



WITNESSES:

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2 SHEETS—SHEET 2.

Fig. 3.

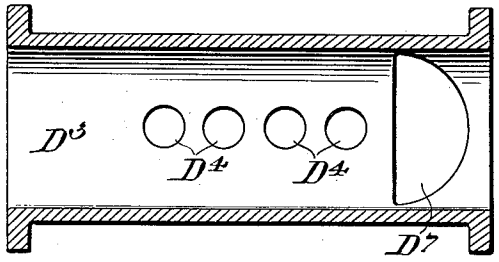


Fig. 4.

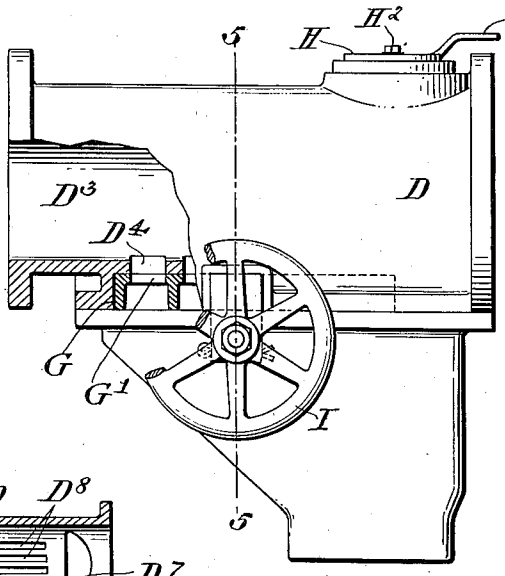


Fig. 6.

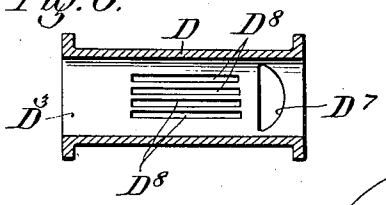


Fig. 7.

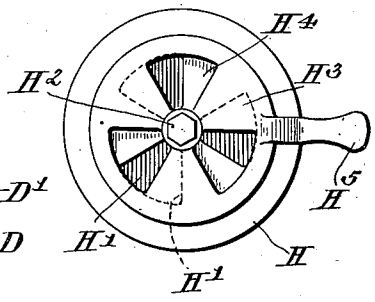
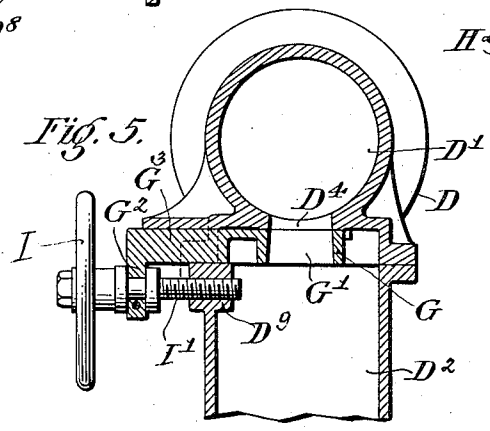


Fig. 5.



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MECHANISM FOR FEEDING PULVERIZED COAL.

954,944. Specification of Letters Patent. Patented Apr. 12, 1910.

Application filed April 9, 1909. Serial No. 488,889.

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 a certain new and useful Improvement in Mechanism for Feeding Pulverized Coal, 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 a furnace or kiln of the kind in which an air blast is employed to blow the coal into the combustion chamber.

The object of the invention is to provide feeding mechanism of the kind which will be relatively simple in construction and reliable in operation and which will insure a uniform and continuous feed of the powdered coal into the air blast chamber.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, reference may be had to the accompanying drawings and descriptive matter, in which I have illustrated and described one of the forms in which the invention may be embodied.

Of the drawings: Figure 1 is a somewhat diagrammatic elevation of the feeding mechanism. Fig. 2 is an enlarged sectional view of a portion of a feeding mechanism embodying my invention. Fig. 3 is a sectional plan of a portion of the conveyer chamber showing the discharge orifices. Fig. 4 is an elevation partly broken away and in section showing a modified construction. Fig. 5 is a sectional elevation taken on the line 5—5 of Fig. 4. Fig. 6 is a view similar to Fig. 3, but showing a modified arrangement of the discharge orifices, and Fig. 7 is a plan view of an air regulating valve which may be used.

Referring first to the construction shown in Figs. 1, 2 and 3, A represents a hopper filled with powdered coal and provided at its lower end with the section A^1 of a screw conveyer casing which is connected by the tubular casing section B to the chute D, through which the coal is passed into the air blast chamber E, from which it is blown by air under pressure supplied by the nozzle E^1 through the tube E^2 into the combustion chamber of furnace F.

The powdered coal is fed with the proper speed through the casing sections A^1 and B into the chute D by means of a screw C, formed with one or more spiral ribs C^1. The screw C has secured to it at one end a beveled gear C^3, which is driven at the proper speed by a beveled driving gear C^4. The chute is divided into upper and lower chambers D^1 and D^2 by means of a curved wall D^3. The wall of the chamber D^1 is shaped and arranged to closely surround the screw C and forms in effect a third section of the inclosing casing of the screw conveyer. The chamber D^2 opens at its lower end into the blast chamber E through the connecting nipple D^6.

Discharge orifices are formed in the wall D^3, which are distributed along a considerable portion of the wall D^3 in a direction parallel to the length of the screw conveyer C and are restricted circumferentially, so that the powdered coal cannot be discharged entirely through a short section of the casing length, but must take place along a considerable extent of the casing length. By this arrangement of restricted ports, I insure that the powdered coal is discharged in fine streams into the chamber D^2 and prevent the coal from being discharged from the screw conveyer intermittently in chunks or masses. The coal thus fed in comparatively thin streams into the chamber D^2, passes with a very desirable uniformity into the air blast chamber. On account of the more or less flocculent nature of the powdered coal, the coal particles tend to separate from one another as they pass through the chamber D^2. The flocculent coal particles are to some extent held in suspension, or rather retarded, during their passage through the chamber D^2, by the air in the chamber, and I sometimes find it desirable to provide means for obtaining a regulated leakage of air into the chamber D^2 in order to regulate the air pressure therein and to obtain the desired feed of the coal under varying conditions.

In the form of the apparatus shown in the drawings a threaded aperture D^8 is formed in the upper side of the wall of the compartment D^1 adjacent the port D^7 and in this aperture is screwed the body portion H of a valve mechanism which I may employ for regulating the admission of air into the chamber D^1 and thereby into the chamber

D^2 of the chute D. The member H is provided with a series of ports H^1 and supports a screw H^2 forming a journal for a disk H^3 provided with apertures or ports H^4 which may be moved into more or less complete register with the ports H^1. A handle H^5 is shown for adjusting the disk H^3.

The valve mechanism described forms a simple and effective means for regulating the leakage of air into the upper portion of the chamber D^2. It will of course be understood that the operation of the air jet from the nozzle E^1 is to partially exhaust the air from the chamber D^2 and I find it desirable usually to supply appreciably more air to the chamber D^2 than passes into that chamber with the powdered coal. The adjustable valve mechanism disclosed forms a simple and convenient means for obtaining and regulating the quantity of this leakage. If the valve mechanism H described is not provided, or is found not to admit a sufficient quantity of air at any time, the air may be admitted through the port D^{51} in the side wall of the chamber D^2 which may be more or less completely closed by the cover D^5. The cover D^5 may be removed when desired to permit the discharge of the coal into the compartment D^2 to be observed. With the arrangement described I avoid the trouble which I have found by extended experience occurs from time to time when screw conveyers are employed which discharge from one or more relatively large orifices directly into an air blast. In such cases disturbances in the operation of the apparatus are produced by the passage into the air blast of the powdered coal in chunks or masses of particles which adhere together, thus preventing the uniform feed of the fuel into the combustion chamber which is necessary for proper operation. With the restricted and distributed port arrangement described and the provision of a chamber between the discharge ports and the air blast chamber in which the more or less flocculent coal particles may lose their adherency, so to speak, for one another, I obtain a more satisfactory and uniform feed for the powdered coal than has heretofore been possible.

The exact shape and arrangement of the discharge orifices is obviously immaterial in obtaining the desired results. Examples of different arrangements are shown in Figs. 3 and 6. In the form shown in Fig. 3, a row of circular perforations D^4 are formed in the wall D^3 and a large perforation D^7 is formed in the wall D^3 at the inner end of the row of perforations D^4, the perforation D^7, it will be understood, takes care of any material which is not discharged through the ports D^4. Instead of the circular ports D^4, I employ in the construction shown in Fig. 6 one or more relatively narrow slots D^8 which are elongated in the direction of the length of the screw. In the form shown in the drawings, the screw C is provided with two ribs C^1, and it will be understood that the provision of a plurality of ribs C^1 on the screw conveyer C assists in obtaining the desired uniformity of feed.

In order to more accurately regulate the fuel discharge through the lateral ports of the conveyer casing, it may, in some cases, be desirable to provide means for adjusting the effective discharge area of the ports in order to better control the feed. This is particularly advantageous when the coal is apt to vary in character from time to time. One arrangement which I may use for adjusting the discharge orifices is shown in Figs. 4 and 5, where I provide a slide G having orifices G^1 which may be moved into more or less complete register with the orifices D^4 by moving the slide bodily in a direction transverse to the chamber D^1. The slide G may be conveniently adjusted by means of the hand wheel I and screw I′ to which the hand wheel is threaded. The screw I′ is threaded into a tapped lug D^9 formed in the chute D and is swiveled in a lug G^2 depending from the portion G^3 of the slide G extending through the side of the chute.

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

1. In mechanism for blowing powdered coal into a combustion chamber, the combination with an air blast chamber of a second chamber located above and opening at its lower end into said air blast chamber, and means for feeding powdered coal into said second chamber above its lower end, comprising a rotary screw and an inclosing casing therefor so perforated as to provide a lateral port area distributed longitudinally and restricted circumferentially of the screw, so that the discharge will take place along a considerable extent of the length of the screw.

2. In mechanism for blowing powdered coal into a combustion chamber, the combination with an air blast chamber of a second chamber located above and opening at its lower end into said air blast chamber, means for feeding powdered coal into said second chamber above its lower end, comprising a rotary screw and an inclosing casing therefor so perforated as to provide a lateral port area distributed longitudinally and restricted circumferentially of the screw, so that the discharge will take place along a considerable extent of the length of the screw, and means for regulating the air pressure in said second chamber.

3. In mechanism for blowing powdered coal into a combustion chamber, the combination with an air blast chamber of a second chamber located above and opening at its lower end into said air blast chamber,

means for feeding powdered coal into said second chamber above its lower end, comprising a rotary screw and an inclosing casing therefor so perforated as to provide a lateral port area distributed longitudinally and restricted circumferentially of the screw, so that the discharge will take place along a considerable extent of the length of the screw, and an adjustable valve regulating the admission of air into said second chamber.

4. In mechanism for blowing powdered coal into a combustion chamber, the combination with an air blast chamber of a second chamber located above and opening at its lower end into said air blast chamber, and means for feeding powdered coal into said second chamber above its lower end, comprising a rotary screw, an inclosing casing therefor so perforated as to provide a lateral discharge port area distributed longitudinally and restricted circumferentially of the screw, so that the discharge will take place along a considerable extent of the length of the screw, and means for adjusting the effective discharge capacity of said ports.

5. In mechanism for blowing powdered coal into a combustion chamber, the combination with an air blast chamber of a second chamber located above and opening at its lower end into said air blast chamber, and means for feeding powdered coal into said second chamber above its lower end, comprising a multiple threaded rotary screw and an inclosing casing therefor so perforated as to provide a lateral discharge port area distributed longitudinally and restricted circumferentially of the screw, so that the discharge will take place along a considerable extent of the length of the screw.

6. In mechanism for blowing powdered coal into a combustion chamber, the combination with an air blast chamber of a second chamber located above and opening at its lower end into said air blast chamber, and means for feeding powdered coal into said second chamber, consisting of a horizontal rotary screw and an inclosing casing therefor extending above the air blast chamber, said casing being formed with a plurality of restricted ports in its underside through which the coal passes into said second chamber, said ports being distributed along a considerable extent of the length of the screw.

7. In mechanism for blowing powdered coal into a combustion chamber, the combination with an air blast chamber of a second chamber located above and opening at its lower end into said air blast chamber, and means for feeding powdered coal into said second chamber above its lower end, comprising a rotary screw and an inclosing casing therefor formed with discharge ports extending along a considerable extent of the length of the casing, and a valve movable transversely to the length of the casing for adjusting the effective discharge area of said ports.

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Witnesses:
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CHAS. B. BRUNNER.