Oct. 15, 1929. F. H. DANIELS 1,731,649

DUAL FEED PULVERIZING APPARATUS

Filed Nov. 6, 1926

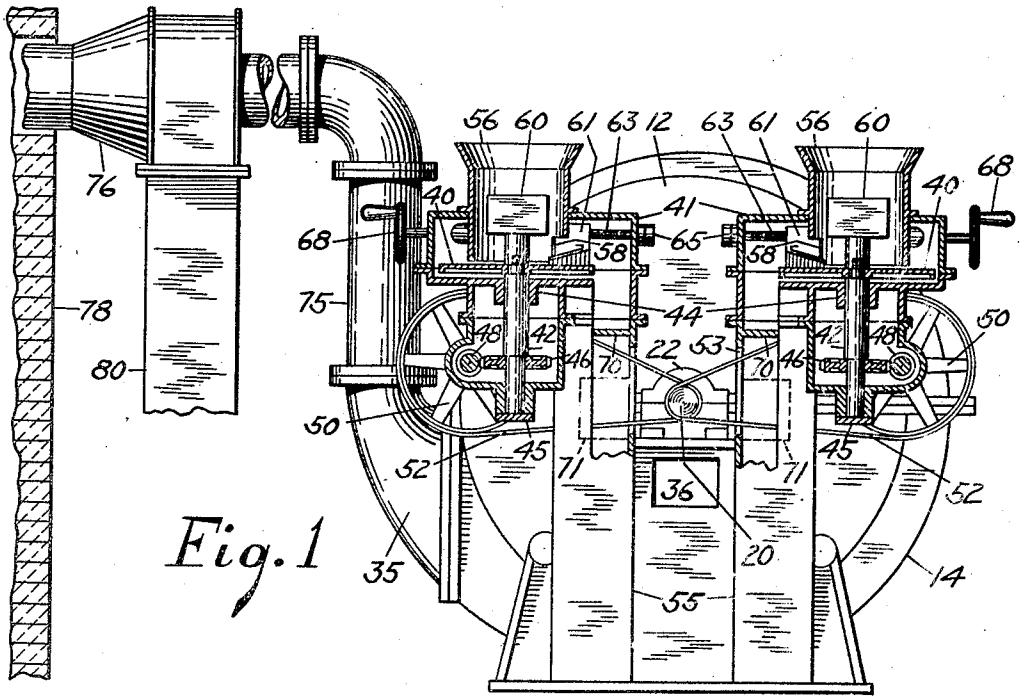


Fig. 1

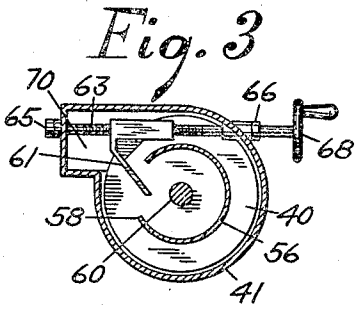


Fig. 3

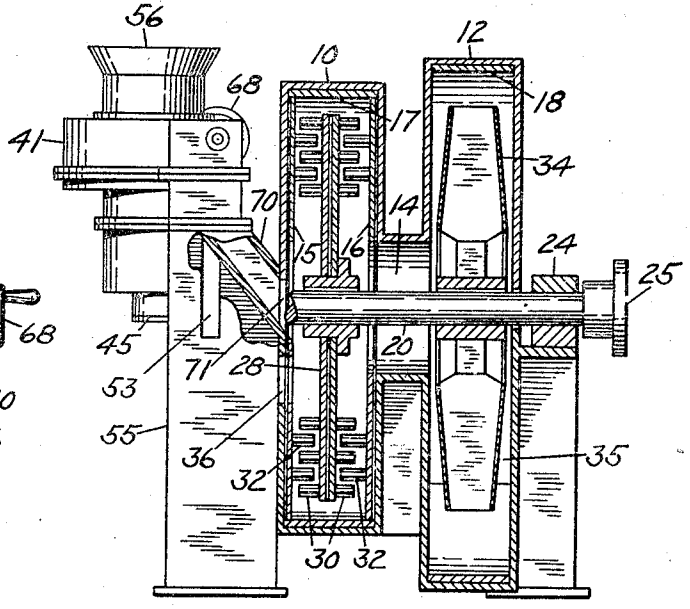


Fig. 2

WITNESS

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UNITED STATES PATENT OFFICE

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DUAL FEED-PULVERIZING APPARATUS

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This invention relates to a pulverizing apparatus, and more particularly to a machine of this type which is arranged to simultaneously mix and pulverize two materials.

In burning pulverized fuel in suspension in a furnace, it is essential that the fuel contain sufficient volatile matter to cause a satisfactory rate of flame propagation, as otherwise it is impossible to maintain a flame. For this reason, great difficulty has been experienced in the past in burning, after pulverization, such fuels as anthracite, coke, and soot which contain a very low per cent of volatile matter. It is therefore desirable in many cases to mix a highly volatile solid material with such fuels to insure proper combustion, and it may be advisable to change the proportions of the two ingredients from time to time as the character of one or the other varies. It is, however, difficult and expensive to mix the fuels before introduction to the pulverizer by the usual methods and apparatus, hence the users of powdered fuel have not heretofore been able to buy various assortments of fuel and mix them as wanted to give a desired type of flame. The degree of uniformity of such a mixture will also affect the nature of the flame, it being desirable to have a uniform product which does not fluctuate constantly in its characteristics.

It moreover is found in pulverizing coal, that the capacity of the pulverizer becomes seriously limited whenever the moisture content of the coal exceeds a certain amount. This has made necessary in the past the installation and operation of expensive and bulky drying devices. Hence it is often wise to mix a drier fuel with the wet material to lower its moisture content. This involves like problems which have been hard to overcome. These same considerations apply in general to other materials. It is often necessary to provide a mixture of two pulverized materials of various chemical and physical properties, and any apparatus or method which will carry out satisfactorily both operations of mixing and pulverizing is commercially desirable.

It is therefore one object of my invention to provide a simple type of apparatus which will mix two different materials in desired proportions and pulverize the same.

A further object is to provide an apparatus which will automatically mix different materials in regulatable proportions and feed them at a desired variable rate and then pulverize and deliver the mixture at a rate which is suitable for the particular material being handled and in accordance with the use to which it is to be put.

With these and other objects in view as will be apparent to one skilled in the art, my invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

In accordance with my invention, I provide a pulverizing apparatus with means for feeding two materials thereto simultaneously at regulatable rates. The pulverizer may be of the unit type, arranged to pulverize material such as fuel and deliver it directly to a storage bin or to a furnace, if intended for combustion purposes. The feeders, coordinated with the pulverizer, are so arranged independently of each other that either may be used alone or operated to feed a given material at a desired rate, so that two materials may be mixed in any suitable proportions. These feeders are operated automatically as the pulverizing device grinds the material to feed the latter as needed. Coordinated with these feeding and grinding members is a further mechanism, such as a fan, to remove the pulverized material and transport it to a desired point.

Referring to the drawings in which like reference numerals indicate like parts:

Fig. 1 is an end elevation of one embodiment of my invention, parts being shown in section;

Fig. 2 is a vertical section through the center of the apparatus shown in Fig. 1, with parts broken away for clearness of illustration; and

Fig. 3 is a horizontal section through one of the feeding devices.

The apparatus illustrated in the drawings comprises a pulverizer of the rotary beater or impact type having two rotary feeding tables so arranged as to feed material di-

rectly to the same pulverizing zone. The specific construction of the pulverizer may be similar to the machines disclosed in the reissue patent to Blyth, No. 16,229, and the patent to Riley, No. 1,576,472. Such a machine may comprise a casing arranged to form a pulverizing chamber 10 and a fan chamber 12 connected by a central outlet passage 14. The pulverizing chamber may be provided with lining plates 15, 16 and 17. The fan chamber may be provided with a lining plate 18. A shaft 20 extends centrally through chambers 10 and 12, and is rotatably mounted in suitable bearings 22 and 24. This shaft is provided with a half coupling 25, for connection to a suitable source of power.

A rotor disk 28 is mounted on the shaft 20 and arranged to rotate in chamber 10. This disk may be provided with pegs 30 on each face which cooperate with stationary pegs 32 on the casing walls. The pegs are suitably mounted on their supports, as disclosed for example in the patent to Riley. In order to withdraw fine material from the chamber 10, a fan 34 is mounted on shaft 20 so as to rotate in chamber 12. The fan chamber is provided with an outlet 35. A suitable air inlet 36 is preferably arranged in the wall of the chamber 10.

Two different materials may be delivered to the pulverizing chamber 10 by two separate feeding devices arranged to permit the desired regulation of the two rates of feed. These may be identical, as shown, except that they are made right and left for convenience in arrangement. Each feeder, as illustrated, may comprise a substantially horizontal disk shaped table 40, rotatably mounted within a casing 41 on a vertical shaft 42. This shaft is supported in bearings 44 and 45, and is slowly rotated by a worm gear 46 fixed thereon and driven by a worm 48. Each worm may be provided with a pulley 50, and may be conveniently driven directly from the pulverizer shaft 20 by a belt 52 which passes through an opening 53 in the pedestal 55. A stationary hopper 56 is mounted on the casing 41 above each table 40, and this hopper is provided with an opening 58 in one side. To assist in rotating the material in the hopper 56, an agitator blade 60 is provided, the blade being mounted on a short post threaded to the upper end of shaft 42.

The amount of material delivered through the openings 58 and swept off the table 40 is determined by an adjustable scraper 61, which is supported in substantial contact with the top surface of the table. This scraper has a nut like portion threaded internally and mounted for adjustment on a horizontal shaft 63 externally threaded on its intermediate portion (see Fig. 3). This shaft 63 is rotatably mounted in bearings in the casing 41, and is prevented from longitudinal movement by collars 65 and 66. The shaft is conveniently rotated by a handwheel 68. By this means, the scraper may be moved in or out to sweep more or less material from the table. An inclined chute 70 is arranged to conduct material swept from the table 40 through opening 71 into the pulverizer chamber. As shown in Fig. 1, there may be two of these openings, one at each side of the shaft 20, for each of the feeders.

In using this apparatus in connection with a furnace, a pipe 75 may be provided leading from the fan discharge 35 to a burner 76 of any suitable type mounted adjacent to an opening in a furnace wall 78. If desired, additional air may be brought to the burner from a fan or other source through a duct 80.

The operation of the invention will now be apparent from the above disclosure. The shaft 20 is rotated by a suitable source of power connected to the half coupling 25. Material is placed in the hopper 56 in each feeder, is rotated by the agitator 60 and table 40, and is swept from the table at a desired rate by the scraper 61, which is suitably positioned by means of handwheel 68. The material passes down chute 70 and enters the chamber 10, where it is pulverized and thoroughly mixed by the action of the pegs 30 and 32. The fan 34 draws the material around the disk 28 and through the passage 14. The mixture leaves the fan casing through discharge 35. Two fuels thus acted upon may pass through pipe 75 to burner 76, and be blown into a furnace for combustion in suspension, as is well known to those skilled in the art.

Hence by means of this apparatus, low volatile fuels may be used with high volatile fuels to obtain a satisfactory rate of flame propagation, and wet coal may be mixed with dry coal to permit the pulverizer to operate at full capacity. Similarly, pigments or other materials may be mixed in proper proportions and pulverized to a desired degree of fineness and then delivered as desired, as for example, to a storage bin. Regulation of the positions of the feeder scrapers 61 determines the relative amounts of materials used. If desired, the two feeders may be employed to feed the same material, and operated either separately or together. Further advantages will be readily apparent to one skilled in the art.

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

1. A pulverizing apparatus comprising a casing having an air inlet on one side and an outlet pipe for the pulverized material on the other side thereof, revoluble members mounted in the casing between the inlet and the outlet which are arranged to pulverize the material fed thereto, means to cause air to flow through the casing to the outlet pipe and transport the pulverized material from the casing, independent feeding devices communicating with the casing which are arranged

to feed different materials positively and at a predetermined rate into the casing on the inlet side of the revoluble pulverizing members, and a separate control for each feeding device so arranged as to permit a predetermined variation in the composition of the mixture.

2. A pulverizing apparatus comprising a casing having an inlet and an outlet on opposite sides thereof, a set of revoluble pulverizing elements mounted between the inlet and the outlet, a fan and an outlet conduit for withdrawing the pulverized material from the casing, and power driven feeding apparatus communicating with the inlet and having two separately regulatable devices arranged to deliver different materials at predetermined rates to the inlet side of the casing and into contact with the same pulverizing elements, whereby the two materials are mixed and pulverized and thereafter withdrawn from the casing through the conduit as a uniform mixture.

3. A pulverizing apparatus comprising a casing having an inlet and an outlet, preliminary and final pulverizing elements revolubly mounted in series therein, a fan and an outlet conduit for withdrawing the pulverized material from the zone of the final pulverizing elements, separate power feeding devices communicating with the inlet for feeding different materials in a predetermined proportion to the preliminary pulverizing elements, said pulverizing elements being arranged to pulverize said materials and to mix them simultaneously, means for driving the feeding devices at uniform rates coordinated with the rate of revolution of the pulverizing elements and means for separately regulating the feeding devices to proportion the materials as desired.

4. An apparatus for treating fuel comprising a casing defining a pulverizing chamber having an inlet and an outlet, revoluble pulverizing elements therein, a conduit from the casing to connect the outlet with a fuel burner, a fan to blow the fuel from the casing to the burner, two power driven feeding devices communicating with the inlet and arranged to deliver different fuels to the pulverizing elements, separate means to regulate the rate at which fuel is fed by each device, and means for introducing air to the casing, whereby the two fuels are mixed in predetermined amounts, pulverized and transported as a uniform mixture through the burner conduit.

Signed at Worcester, Mass., this 4th day of November, 1926.

FRED H. DANIELS.