Feb. 16, 1926. 1,573,040

J. CRITES

MEANS FOR PULVERIZING, FEEDING, AND BURNING FUEL

Filed March 8, 1924 2 Sheets-Sheet 1

Fig. 1.

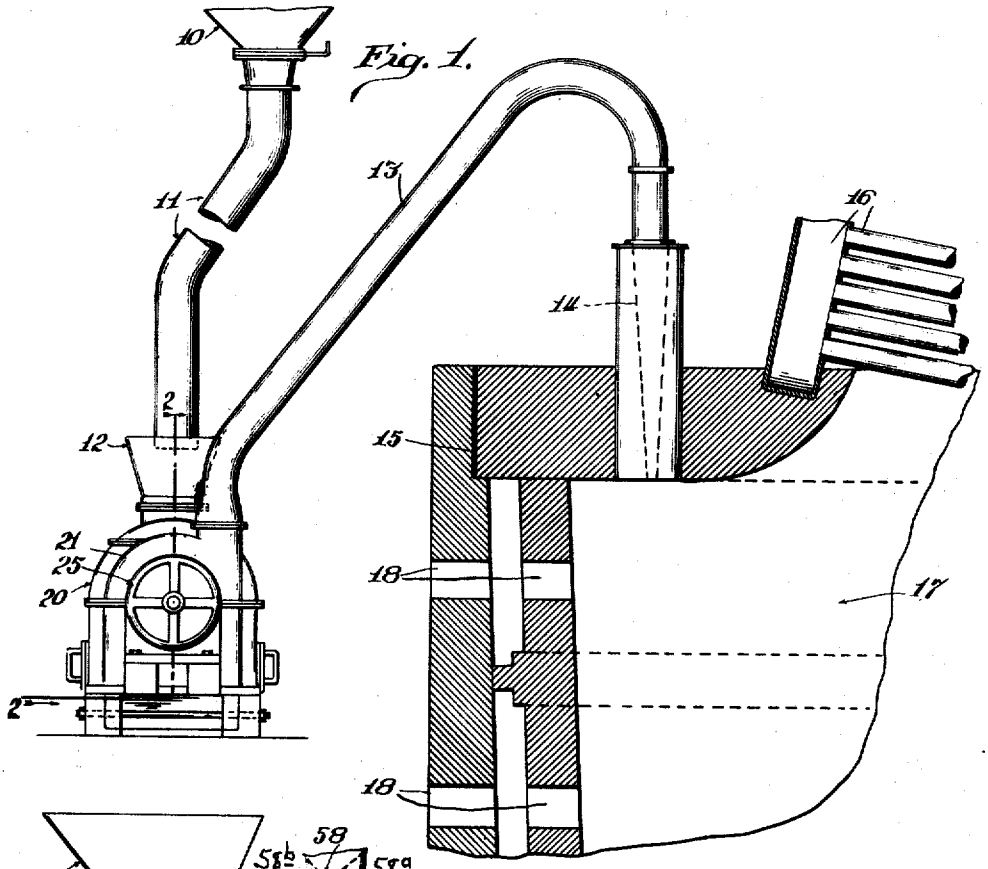
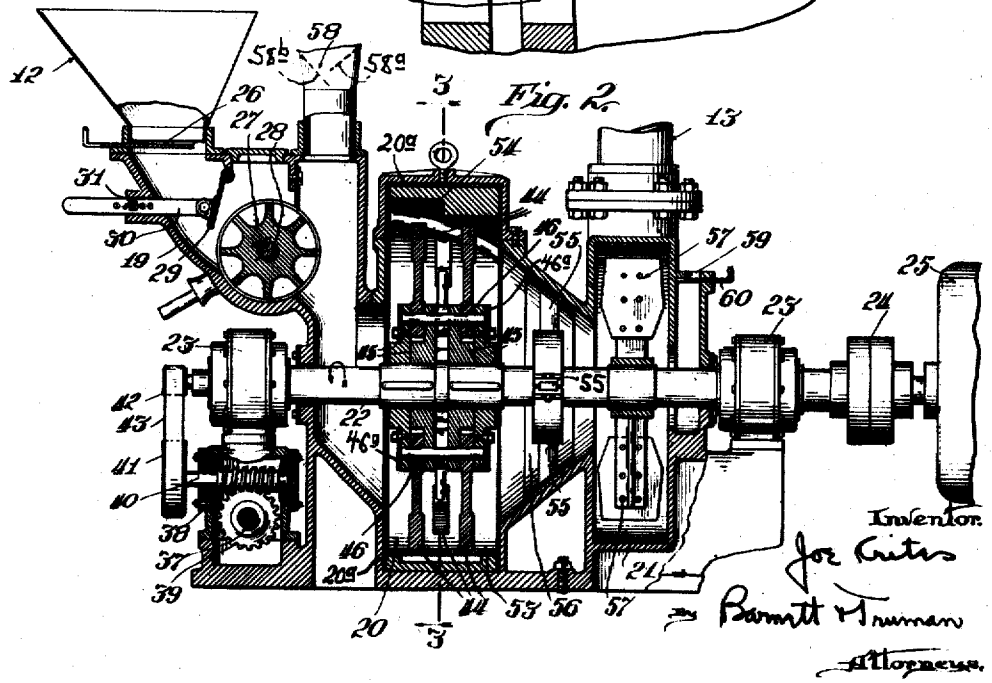


Fig. 2.



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Fig. 3.

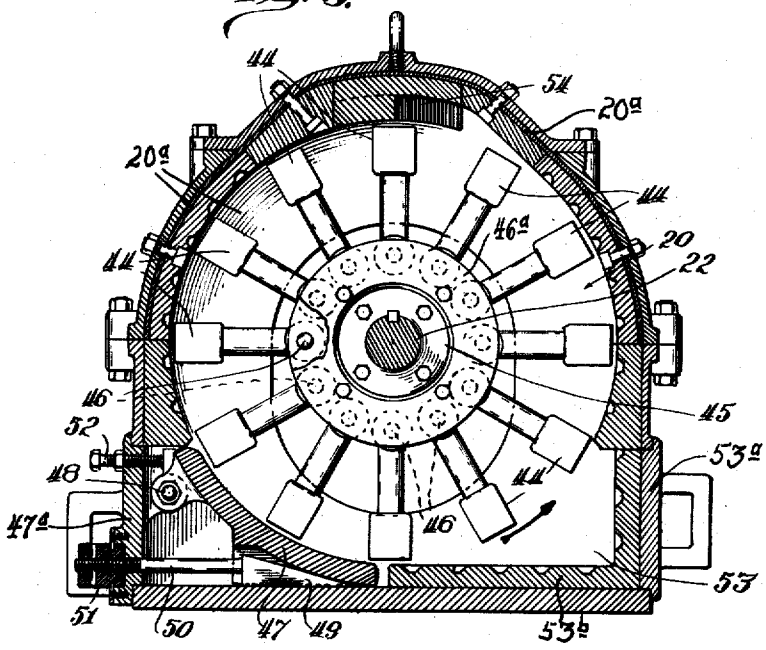


Fig. 4.

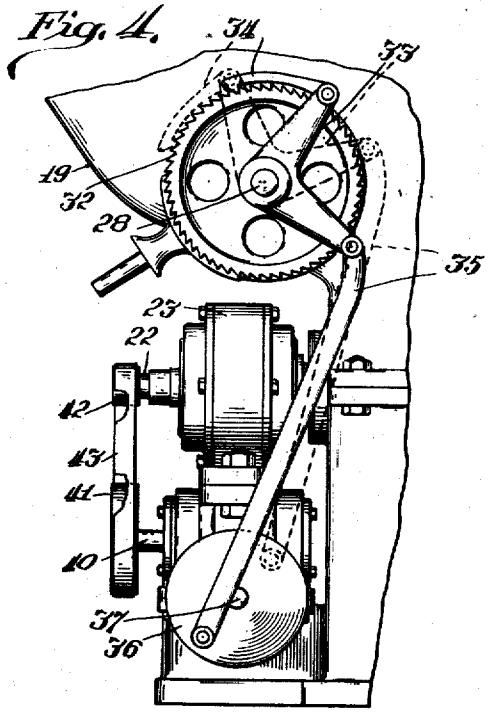
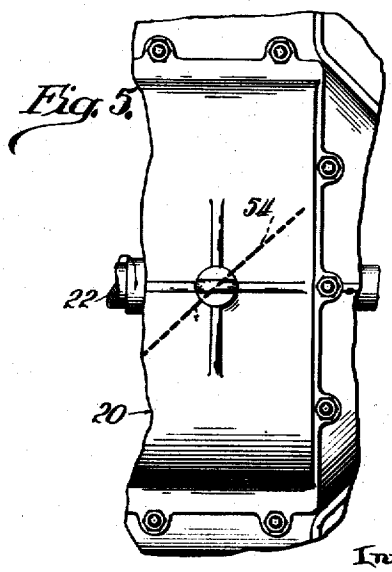


Fig. 5.



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Patented Feb. 16, 1926. 1,573,040

UNITED STATES PATENT OFFICE.

JOE CRITES, OF LAKESIDE, OHIO, ASSIGNOR TO RAYMOND BROTHERS IMPACT PULVERIZER CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MEANS FOR PULVERIZING, FEEDING, AND BURNING FUEL.

Application filed March 8, 1924. Serial No. 697,894.

To all whom it may concern:

Be it known that I, JOE CRITES, a citizen of the United States, residing at Lakeside, in the county of Ottawa and State of Ohio, have invented certain new and useful Improvements in Means for Pulverizing, Feeding, and Burning Fuel, of which the following is a specification.

This invention relates to means for pulverizing, feeding and burning fuel, and it is the principal object of the invention to provide an improved form, organization, and arrangement of parts by which an operative and efficient system shall be produced for pulverizing fuel and feeding it directly to the furnace so as to obtain satisfactory results. Efforts have been made heretofore to work out a form and organization of parts by the use of which fuel, such as coal, could without preliminary drying, be pulverized and fed directly to a furnace so as to meet normal requirements with respect to heat production and ease of furnace operation, but prior to the production of the system of this invention, such efforts had not been completely successful.

It has been the particular object of this invention to produce a system, comprising a swing hammer beater mechanism, in which a small volume of high pressure air is utilized under complete control for delivering the pulverized fuel to the furnace at the upper portion thereof so regulated and directed that the flames from the burner sweep downwardly across the front of the furnace almost but not quite to the bottom of the furnace, taking in additional air for complete combustion at various points on the downward sweep. It has been found in practice that this system is very effective for obtaining good results with undried coal pulverized and fed directly to the furnace.

It is another object of this invention to improve the pulverizing mill used in a system of this type in sundry details as will appear hereinafter from the description of the construction and operation of the system.

In the drawings—

Fig. 1 is a central vertical section through a furnace, partly broken away, provided with the improved fuel pulverizing and feeding mechanism.

Fig. 2 is a central longitudinal section through one of the pulverizing and feeding units of the system shown in Fig. 1, being substantially a section taken on line 2—2 of Fig. 1.

Fig. 3 is a transverse sectional view through the beater chamber, being substantially a section taken on line 3—3 of Fig. 2.

Fig. 4 is a detailed vew, showing a portion of the operating mechanism for the pulverizing and feeding units; and

Fig. 5 is a fragmentary top plan view of the beater chamber of the unit shown in Fig. 2 and indicating by dotted lines the position of the breaker plate with respect to the direction of rotation of the pulverizing hammers.

Referring now particularly to Fig. 1 of the drawings, 10 indicates a stationary bin for coal or other like solid fuel, adapted to be delivered through a pipe 11 to the hopper 12 of a pulverizing mill. From the mill the fuel is delivered as hereinafter described through a pipe 13 and a flattened nozzle 14 to the upper portion of a furnace 15, upon which is set a boiler 16 in the path of the flames and hot gases rising from the fire box 17. The front wall of the furnace is shown as being provided with a plurality or air openings 18 through which the greater portion of the auxiliary air required for the complete combustion of the fuel is admitted. A small portion of auxiliary air is also drawn in by induction through the port through which the nozzle or burner 14 extends. Fig. 1 illustrates only one of the two pulverizing and feeding units employed, the other similar unit being, of course, located in front of the other half of the furnace 15, not shown.

The pulverizing and feeding mill comprises a feeding compartment 19, a beater chamber 20, and a fan chamber 21, a shaft 22 extending through the housing providing such chambers, such shaft being supported by bearings 23 and being driven by the use of a coupling 24 from a motor 25.

As is clearly shown in Fig. 2, the hopper 12 is provided with a slide valve 26 by which the size of the opening into the chamber 19 is controlled. Below the level of the hopper 12, there is located a pocketed feed wheel 27 mounted on a shaft 28 so as to rotate in clockwise direction in Fig. 2, as hereinafter described. Between the feed wheel 27 and the hopper, there is pivotally mounted a flap 29, the position of which is

adjustably controlled by a link 30 and pin 31, as will be readily understood.

The feed wheel 27 is driven, in the construction shown, by means of ratchet wheels 32 (see Fig. 4) mounted on the ends of the shaft 28. Loosely mounted on the shaft 28 adjacent to each of the ratchet wheels 32, there is a bell crank lever 33, one arm of each of said levers 33 being provided with a pawl 34 adapted upon the oscillation of the bell crank to give intermittent rotation to the adjacent ratchet wheel and thus to rotate the feed wheel 27. The bell crank levers 33 are oscillated by pitmans 35 connected respectively with crank heads 36 carried by opposite end portions of a shaft 37 which is driven by means of a worm 38 and worm gear 39, from a shaft 40, which in turn is driven by pulleys 41 and 42 and a belt 43 from the shaft 22.

The arrangement of the gearing is such that when the shaft 22 is rotated in the direction indicated by the arrow in Fig. 2 at a speed of approximately 1800 revolutions per minute, the feed wheel 27 will be rotated in clockwise direction in Fig. 2 at the desired much reduced speed of rotation.

The beater element of the mill comprises a plurality of swing hammers 44 pivotally mounted on the shaft 22 within the chamber 20, such hammers or beaters being pivoted close to the axis of the shaft by means of collars 45 and pins 46. As is shown in Fig. 3, the outside diameter of the collars 45 is not more than about one-half as great as the interior diameter of the chamber 20, whereby it is possible to use long beaters of the ordinary swing hammer type. Suitable liners are provided for the chamber 20 about the outer ends of the hammers 44, the hammers 44 being normally held in radial position by centrifugal force during the operation of the machine. An adjustable liner 47 is employed at one point, pivotally mounted on a pin 48 so as to be movable towards the center of the chamber as wear may necessitate such adjustment. The desired adjustment is effected through the use of the wedge 49 controlled by the shank 50 which is screw threaded and engages with a nut 51. An adjustable stop screw 52 is used for limiting the upward movement of the liner.

In order to trap heavy bodies not readily crushed, such as pieces of metal, a pocket 53 is provided at the bottom of the chamber 20, the pocket being readily opened for removal of the trapped material by the removal of the plate or door 53^a. In the construction shown, the adjacent section of the liner 53^b is secured to the plate 53^a and is removable therewith, such section being substantially in the form of a scoop, as is clearly shown in Fig. 3. By reason of the pivotal mounting of the beaters 44, and particularly by reason of their being of the swing hammer type pivoted comparatively close to the axis of rotation, the likelihood of serious damage to the mill by reason of the reception of a bolt or similar article is very small. As will be readily understood, when, in the construction shown, a bolt or similar article is caught between one of the hammers 44 and a portion of the liner, the hammer is adapted to yield the necessary amount for permitting the foreign body to drop out of the way.

As is seen from an inspection of Fig. 3, the adjustable liner section 47 is preferably located with its free edge directly opposite the inner edge of the liner section 53^b by which the pocket 53 is defined. Provision is thus made for adjustment with respect to the pocket. As the section 47 becomes worn, it can be adjusted upwardly to keep its inner face even with or slightly above the upper face of the horizontal portion of the pocket liner section 53^b. This insures that a foreign body can always slide freely from the section 47 to the section 53^b without objectionable contact with the edge of the section 53^b.

In the construction shown, the liner section 47 and the adjusting wedge 49 are mounted on a removable plate 47^a, the parts being so arranged that when the plate 47^a is removed the liner and wedge are slidable therewith out of position. This provides for a ready renewal of the liner section 47 as may be necessary.

At the top of the chamber 20, a breaker plate 54 is provided, the face of the plate being diagonally disposed with respect to the axis of rotation of the hammers, for the reasons hereinafter set forth.

Between the beater chamber 20 and the fan chamber 21 there mounted a regulator comprising in the construction shown four radially disposed plates 55 mounted upon the shaft 22 so as to rotate therewith. The ends of the plate 55 extend to within a short distance from the inner face of the conical ring 56, the ends of the plates 55 being diagonally disposed to correspond to the inclination of the face of the ring. The plates 55 are preferably adjustable radially with respect to the shaft 22 and are also adjustable longitudinally of the shaft so as to vary the distance between the ends of the plates and face of the ring.

A high pressure fan 57 having long blades and adapted to deliver a small volume of air at high pressure is mounted on the shaft 22 within the chamber 21 so arranged that upon the rotation of the shaft 22 in the direction indicated by the arrow in Fig. 2, air is forced out from the chamber 21 through the pipe 13. Such air is admitted to the chamber 21 in part from the chamber 20 to which in turn it is admitted through the inlet pipe 58 from any suitable source of either atmospheric or preheated air. The

pipe 58 is provided with a baffle plate 58[a] and an adjustable damper 58[b] which together serve to prevent particles of fuel from escaping from the chamber and also to control the mount of air entering through the pipe 58. A further supply of air is admitted to the chamber 21 through a variable opening 59 controlled by a slide 60 at the side of the fan 57 opposite from that at which the beater chamber 20 is located. The air admitted at 59 may also be either atmospheric air or preheated air.

In operation, coal or other suitable fuel is supplied to the hopper 12 by any suitable controlling means, not shown. The amount of the feed to the feed wheel is controlled by the position of the slide 26 and the position of the flap 29, as is well understood in the art. With the feed wheel 27 rotating at the desired speed in clockwise direction in Fig. 2, the fuel is admitted in measured quantities to the beater chamber 20.

With the hammers 44 being carried about the axis of the shaft 22 at the rate of 1800 revolutions per minute, there is a very marked beating effect upon the fuel as it is forced about the face of the chamber 20 with the hammers. As will be readily understood, the largest and heaviest particles of the fuel will be most affected by the centrifugal force and will accordingly be brought into contact with the liner of the chamber 20. When such heavier particles are brought into contact with the face of the breaker plate 54, such particles are given a heavy blow, tending very materially to reduce their size, and tending also, by reason of the diagonal position of the plate 54, to force such heavier particles toward the left in Fig. 2,—that is to say, toward the entrance side of the chamber 20.

The action of the regulator comprising the plates 55 serves to reduce very materially the amount of air and fuel passing into the chamber 21. This device acts as a fan for continuing the rotary movement of the contents of the chamber 20 about the axis of the shaft 22, having a tendency by centrifugal force to throw the contents into contact with the diagonally disposed inner face of the ring 56 by which the material is forced toward the left in Fig. 2 away from the chamber 21. The amount of air entering the chamber 21 from the chamber 20 is accordingly very small as compared with the amount that would so pass if the regulator were not employed. By regulating the position of the damper 58[b] and the slide 60, and regulating the position of the plates 55 with respect to the inner face of the ring 56, the amount of air entering the chamber 21 from the chamber 20, as compared with the amount of air entering through the opening 59 can be very accurately controlled. As will be readily understood, when the regulator is adjusted toward the right in Fig. 2, so as to make it harder for the fuel and air to pass, the fuel will be pulverized more finely by reason of its being retained a much longer time in the beater chamber.

In some instances, the opening 59 will be closed entirely so that no air is delivered to the burner 14 except that entering through the pipe 58. In such instance the damper 58[b] controls the amount of air admitted for obtaining the desired pressure at the nozzle 14.

By an appropriate adjustment of the several controlling means as above described, the amount of air passing through the chamber 20 can be controlled and kept at the desired low velocity for the pulverizing operation. By the adjustment of the slide 60, the amount of air passing from the fan to the burner can be controlled and kept at the desired high pressure, this being effected without affecting the conditions in the beater chamber. Thus complete control of the feed is secured so as to insure the desired results.

By the use of swing hammers for the moving element of the beater, such hammers being pivotally mounted in close proximity to the shaft, it is possible to provide a considerably greater clearance for the passage of air and fuel through the chamber 20, since in connection with the pivotally mounted beaters it is not necessary that the beaters be supported at or near their outer ends. In cases where it is necessary to support the beater devices near the inner face of the liner, such supporting means take up so much room that it is impossible to provide the desirable open space within the chamber. This feature is, accordingly, of very considerable importance, since it permits the use of the desired large stream of low velocity air for floating the pulverized fuel away instead of a much smaller stream of higher velocity air. Moreover, with the large opening through the beater chamber along the shaft 22, any possible tendency of the chamber to choke up by reason of the collection of a layer of fuel about the grinding face of the chamber is very materially lessened.

As will be readily understood, the air entering the fan chamber 21 through the opening 59, if any, is thoroughly mixed with the air coming from the chamber 20 with the pulverized fuel in suspension therein, such mixing taking place within the chamber 21 and along the pipe 13 leading to the burner 14. The admission of such auxiliary air through the opening 59 with that coming from the chamber 20 insures a more effective transportation of the pulverized fuel to the furnace, as well as being the means for controlling the pressure at the burner 14. Additional auxiliary air for the complete combustion of the fuel is, of course,

admitted through the openings 18 and through the opening about the burner 14, such air being drawn in by induction and by the force of the draft.

By reason of the uniformity of the mixture of air and fuel as delivered to the furnace 14 by the pulverizing and beating means, highly satisfactory results have been attained in the operation of the furnace, it being possible to feed the pulverized fuel directly from the mill to the furnace without first separating and storing it. Since by the use of the system of this invention it has been found possible satisfactorily to use undried coal, the pulverized product being fed directly to the furnace, it will be appreciated that the expense of preparation of the fuel for use is very materially reduced, and the invention is of corresponding importance.

As is shown in Fig. 2, the discharge opening for the air and pulverized fuel is substantially central with respect to the shaft which extends through the opening. While I prefer to employ this type of central discharge opening, it will be understood that I do not wish to be limited to the precise form as shown, except so far as the same is specifically claimed.

So far as I am aware, I am the first in the art to provide an adjustable liner member such as the part 47 with its front edge in the direction of rotation of the beaters located opposite the adjacent edge of the scoop member so that the liner member can be kept adjusted to the desired position with respect to the scoop, and I therefore desire to claim this feature broadly. The adjustment of the liner member 47 inwardly toward the path of the swing hammers also affects the fineness of the pulverization, but it is feasible at all times to keep the face of the liner 47 at as high a level as that of the inner face of the scoop.

By the use of the construction shown for mounting the swing hammers the pins 46 being held in position by the movably mounted rings 46ª, the assembling of the mill originally is very greatly facilitated and the trouble and expense of repairs are greatly reduced. Moreover, a hammer 44 cannot become disconnected except by the complete loosening of a ring 46ª, which would be promptly noted by an attendant before serious damage was done.

While it is desired that the form of construction be employed substantially as illustrated in the drawings, it will be understood that the invention is not to be limited to the detailed form of construction precisely as illustrated, except as the same may be hereinafter specifically claimed, since changes may well be made in the particular form of construction without departing from the spirit of the invention.

As is clearly shown in Figs. 2 and 3, the walls of the chamber 20 about a considerable portion thereof are formed in two thicknesses, or three thicknesses including the liners. The outer thickness of the wall is designed to be made up of a plurality of castings, with a steel plate or plates 20ª interposed between the outer thickness and the liners. By this construction, the desired design and form are readily given to the chamber parts by the use of the castings, while at the same time the required strength is afforded by the steel plates without the use of unduly heavy parts.

I claim:

1. A pulverizing mill comprising a beater chamber, rotary means in said chamber for pulverizing material fed thereto, and a breaker plate in diagonal position with respect to the direction of rotation of the pulverizing elements adapted by contact with the partially pulverized particles to direct such particles toward the feed side of the chamber.

2. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized to said beater chamber, and a breaker plate in diagonal position with respect to the direction of rotation of the swing hammers adapted by contact with the partially pulverized particles to direct such particles toward the feed side of the chamber.

3. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized to said beater chamber, and a breaker plate at the periphery of the beater chamber arranged diagonally thereacross adapted by contact with the partially pulverized particles to direct such particles toward the feed side of the chamber.

4. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized to said beater chamber, means for creating a draft of air into the beater chamber on one side of the swing hammers and out from the beater chamber adjacent to the shaft on the opposite side of the swing hammers, and a breaker plate at the periphery of the beater chamber arranged diagonally across the chamber adjacent to the path of movement of the hammers adapted by contact with the partially pulverized particles to direct such particles toward the feed side of the chamber.

5. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on

said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, and means for creating a draft of air into the beater chamber along the shaft past the swing hammers and out at a substantially central opening adjacent to the shaft, said chamber being provided with a pocket for trapping foreign bodies so arranged as to be accessible from the outside of the chamber for removal of said foreign bodies.

6. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, and means for creating a draft of air into the beater chamber along the shaft past the swing hammers and out at a substantially central opening adjacent to the shaft, said chamber being provided with a pocket near the bottom of the chamber for trapping foreign bodies so arranged as to be accessible from the outside of the chamber for removal of said foreign bodies.

7. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, and means for creating a draft of air into the beater chamber along the shaft past the swing hammers and out at a substantially central opening adjacent to the shaft, said chamber being provided with a pocket one wall portion of which is in substantially tangential position with respect to the path of the swing hammers and so disposed as to retain foreign bodies sliding from the hammers thereinto.

8. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, and means for creating a draft of air into the beater chamber along the shaft past the swing hammers and out at a substantially central opening adjacent to the shaft, said chamber being provided with a pocket the bottom wall of which is arranged substantially horizontally and substantially tangentially with respect to the path of the swing hammers.

9. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, and means for creating a draft of air into the beater chamber along the shaft past the swing hammers and out at a substantially central opening adjacent to the shaft, said chamber being provided with a pocket, one wall portion of which is in substantially tangential position with respect to the path of the swing hammers and is so disposed as to retain foreign bodies sliding from the hammers thereinto, means being provided for affording access to the pocket from the outside of the chamber for removal of the trapped foreign bodies.

10. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, a liner member movably mounted in position in close proximity to the path of the swing hammers, and a wedge on the outer face of the liner adapted by adjustment to vary the position of the liner member with respect to the hammers.

11. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, a liner member pivotally mounted in close proximity to the path of the swing hammers, and adjustable means acting on said liner member for varying its position with respect to the swing hammers.

12. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, a liner member pivotally mounted in close proximity to the path of the swing hammers, adjustable means for varying the position of the liner member with respect to the swing hammers, and other adjustable means for limiting the inward movement of the liner member.

13. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, a liner member pivotally mounted in close proximity to the path of the swing hammers, adjustable means for varying the position of the liner member with respect

to the swing hammers, and a set screw accessible from the outside of the chamber for limiting the inward movement of the liner member.

14. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, a liner member pivotally mounted in close proximity to the path of the swing hammers, and means accessible from the outside of the chamber for adjusting the position of the liner member with respect to the hammers.

15. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into said beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, a liner member pivotally mounted in close proximity to the path of the swing hammers, a wedge against which said liner member rests, and screw threaded means accessible on the outside of the chamber for adjusting the position of the wedge for varying the position of the liner member with respect to the hammers.

16. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, a liner member pivotally mounted in close proximity to the path of the swing hammers, screw threaded means accessible on the outside of the chamber for adjusting the position of the liner member with respect to the swing hammers, and other means adjustable from the outside of the chamber for limiting the inward movement of the liner member.

17. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, the wall of the chamber being at one point in the form of a removable door, and a liner member pivotally mounted on the inner face of said door in close proximity to the path of the swing hammers.

18. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, the wall of the chamber being at one point in the form of a removable door, a liner member pivotally mounted on the inner face of said door in close proximity to the path of the swing hammers, and adjustable means carried by the door for controlling the position of the liner member with respect to the swing hammers.

19. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, the wall of the chamber being at one point in the form of a removable door, a liner member pivotally mounted on the inner face of said door in close proximity to the path of the swing hammers, and adjustable means carried by the door and accessible from the outer face thereof for adjustment for controlling the position of the liner member with respect to the swing hammers.

20. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, said chamber being provided with a pocket for trapping foreign bodies so arranged as to be accessible from the outside of the chamber for removal of the foreign bodies, and a liner member adjustably mounted adjacent to said pocket.

21. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, a pocket member substantially in the form of a scoop open toward the swing

hammers, and a liner member mounted with its edge substantially opposite the edge of the scoop and adjustable inwardly with respect to the inner face of the scoop as wear takes place.

22. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, the wall of the chamber being at two points in the form of removable doors, an inwardly extending scoop mounted on the inner face of one of said doors and removable therewith, a liner member pivotally mounted on the inner face of the other of said doors and extending into close proximity to the open end of said scoop, and means for adjusting the liner member inwardly with respect to the inner face of the scoop as wear takes place on the liner member.

23. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, the wall of the chamber at the bottom being in the form of oppositely disposed similar removable doors, an inwardly extending scoop mounted on the inner face of one of said doors and removable therewith, a liner member pivotally mounted on the inner face of the other of said doors and extending into close proximity to the open end of said scoop, and means for adjusting the liner as wear takes place for keeping its inner face substantially in alignment with the inner face of the scoop.

24. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, a collar fixed on said shaft, pins extending through openings in the collar longitudinally of the shaft, swing hammers pivotally mounted on said pins, and rings removably mounted in position for holding the pins against withdrawal.

25. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, a plurality of collars fixed on said shaft, pins extending through openings in the collars longitudinally of the shaft, swing hammers pivotally mounted on said pins between said collars, and rings removably mounted in position for holding the pins against withdrawal.

26. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, a plurality of swing hammers pivotally mounted on said shaft within said chamber, means for feeding material to be pulverized into said chamber, and means for creating a draft of air through the chamber longitudinally of the shaft for carrying the pulverized material from the chamber, the wall of the chamber comprising an outer thickness in the form of a casting, an inner thickness in the form of a liner, and an intermediate thickness in the form of a steel plate.

27. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, a plurality of swing hammers pivotally mounted on said shaft within said chamber, means for feeding the material to be pulverized into said chamber, and means for creating a draft of air through the chamber longitudinally of the shaft for carrying the pulverized material from the chamber, the wall of the chamber comprising a plurality of castings defining the shape of the chamber, a plurality of steel plates secured at points on the inner faces of the castings, and a plurality of liner members secured on the inner faces of the steel plates.

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hammers, and a liner member mounted with its edge substantially opposite the edge of the scoop and adjustable inwardly with respect to the inner face of the scoop as wear takes place.

22. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, the wall of the chamber being at two points in the form of removable doors, an inwardly extending scoop mounted on the inner face of one of said doors and removable therewith, a liner member pivotally mounted on the inner face of the other of said doors and extending into close proximity to the open end of said scoop, and means for adjusting the liner member inwardly with respect to the inner face of the scoop as wear takes place on the liner member.

23. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, swing hammers pivotally mounted on said shaft within the chamber, means for feeding material to be pulverized into said beater chamber, means for creating a draft of air into the beater chamber along the shaft past the hammers and out at a substantially central opening adjacent to the shaft, the wall of the chamber at the bottom being in the form of oppositely disposed similar removable doors, an inwardly extending scoop mounted on the inner face of one of said doors and removable therewith, a liner member pivotally mounted on the inner face of the other of said doors and extending into close proximity to the open end of said scoop, and means for adjusting the liner as wear takes place for keeping its inner face substantially in alignment with the inner face of the scoop.

24. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, a collar fixed on said shaft, pins extending through openings in the collar longitudinally of the shaft, swing hammers pivotally mounted on said pins, and rings removably mounted in position for holding the pins against withdrawal.

25. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, a plurality of collars fixed on said shaft, pins extending through openings in the collars longitudinally of the shaft, swing hammers pivotally mounted on said pins between said collars, and rings removably mounted in position for holding the pins against withdrawal.

26. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, a plurality of swing hammers pivotally mounted on said shaft within said chamber, means for feeding material to be pulverized into said chamber, and means for creating a draft of air through the chamber longitudinally of the shaft for carrying the pulverized material from the chamber, the wall of the chamber comprising an outer thickness in the form of a casting, an inner thickness in the form of a liner, and an intermediate thickness in the form of a steel plate.

27. A pulverizing mill comprising a beater chamber, a shaft extending into said chamber, a plurality of swing hammers pivotally mounted on said shaft within said chamber, means for feeding the material to be pulverized into said chamber, and means for creating a draft of air through the chamber longitudinally of the shaft for carrying the pulverized material from the chamber, the wall of the chamber comprising a plurality of castings defining the shape of the chamber, a plurality of steel plates secured at points on the inner faces of the castings, and a plurality of liner members secured on the inner faces of the steel plates.

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Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,573,040, granted February 16, 1926, upon the application of Joe Crites, of Lakeside, Ohio, for an improvement in "Means for Pulverizing, Feeding, and Burning Fuel," errors appear in the printed specification requiring correction as follows: Page 2, line 105, after the word "there" insert the word *is*, and line 109, for the word "plate" read *plates;* page 3, line 5, for the word "mount" read *amount;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23d day of March, A. D. 1926.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.

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