Oct. 3, 1961 KARL-HEINZ KAYATZ 3,002,701

AIR-SWEPT PULVERIZING APPARATUS

Filed March 6, 1958

FIG. 1

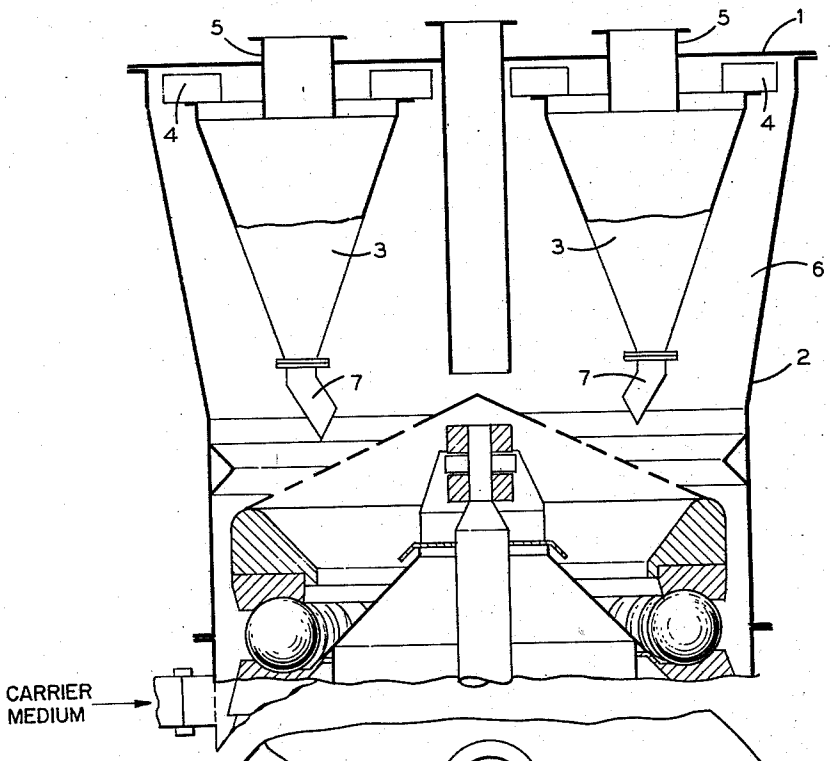
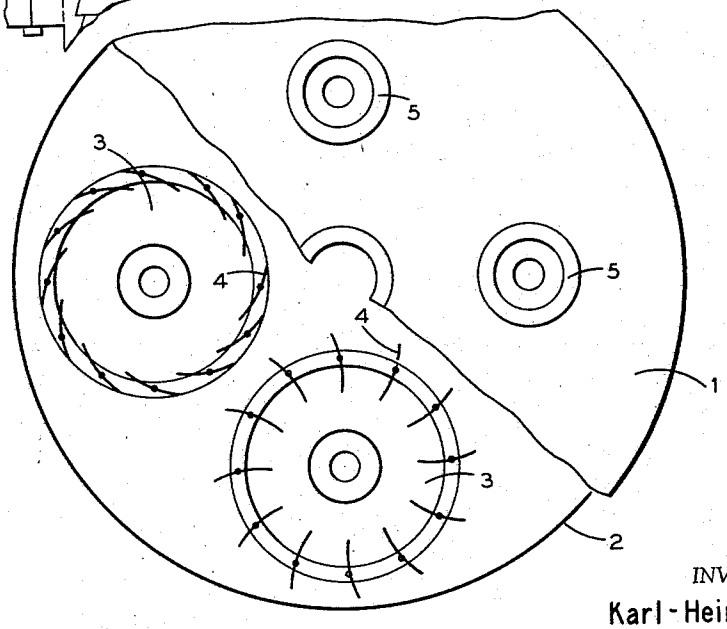


FIG. 2



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AIR-SWEPT PULVERIZING APPARATUS

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2 Claims. (Cl. 241—52)

This invention relates to air swept pulverizers, and more particularly to pulverizers of the direct firing type wherein the pulverizer prepares and discharges air-borne pulverized fuel directly to a plurality of burners.

Heretofore, a pulverizer of the direct firing type serving multiple burners has usually been provided with a single classifier which is positioned in the pulverizer housing or in a separate housing directly communicating with the grinding zone of the pulverizer. With pulverizers having a single classifier, the distribution of fuel to multiple burners has encountered distribution problems as to the quantity and quality of the fuel and air mixture delivered to the individual burners. Such problems are largely due to the fact that the distribution of the fuel to separate burner lines occurs downstream from the classifier.

Frequently, the classifier used in a pulverizer of the direct firing type includes a circumferentially spaced series of vanes which are adjustable so as to regulate the centrifugal force applied to the air-borne solid material entering the classifier and to therby control the fineness of the pulverized product delivered from the classifier. Ordinarily, the vanes are adjustable from the exterior of the pulverizer so that adjustments may be made during operation.

It has also been found that the increased size of the furnaces supplied by pulverizers and the increased size of the pulverizers has also led to a lack of sufficient spaced available within the pulverizer for the usual classifier.

In accordance with the present invention, the distribution of fuel streams to multiple burners and lack of available space in a direct firing pulverizer has been overcome by the use of a plurality of separate classifiers each of which is connected to supply a separate stream of fuel and air to each separate burner. With this arrangement, the classifiers aid in a proper distribution of fuel and air mixture to multiple burners and since each classifier is individually adjustable by means of pivoted vanes, proper distribution of fuel to multiple burners from a single pulverizer can be accomplished.

In addition, the use of a multiplicity of relatively small classifiers has aided in solving the available space problem within the pulverizer housing. With the construction of the present invention, the available space within a direct firing pulverizer serving multiple burners provides sufficient space to accommodate the multiple classifiers of the invention.

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, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described a preferred embodiment of the invention.

Of the drawings:

FIG. 1 is an elevation, partly in section, of the upper portion of an air-swept pulverizer constructed in accordance with the present invention; and

FIG. 2 is a plan view of the pulverizer shown in FIG. 1 with the top of the pulverizer housing partly omitted.

The pulverizer construction shown in the drawings is disclosed and claimed in my companion application Serial No. 718,877, filed March 3, 1958. In said application, the construction and arrangement of the pulverizing zone, with provisions for the carrier air introduction, is fully described and claimed.

As shown in FIGS. 1 and 2, of the drawings, the pulverizer 2 is provided with a top cover plate 1, where the cover plate is provided with four outlet openings 5. The lower portion of the pulverizer is provided with a pulverizing zone as described in my copending application, while the upper portion of the pulverizer is provided with four centrifugal classifiers 3. The classifiers 3 are each provided with a circumferential row of vanes 4, having adjustable blades. From each classifier 3 a connecting duct 5 leads to one of the burner pipes leading to the burners of a pulverized fuel fire furnace (not shown). Thus, in the embodiment shown, a separate classifier 3 is provided for each of the outlet openings 5. A greater or lesser number of classifiers and outlet openings can be used, but each outlet opening should be provided with a separate classifier.

The mixture of air-borne pulverized fuel discharged upwardly from the grinding zone of the unit enters a gravity classification space 6 wherein a preliminary separation of oversized materials from the carrier medium or air takes place. From the gravity classification space 6, the mixture of pulverized fuel and air enters the separate classifiers 3 through the openings between the blades of the vanes 4. The centrifugal action of the entering streams of air-borne pulverized fuel separates the finer materials from the coarser materials with the finer particles of air-borne fuel discharging from the classifier through the connecting duct 5. At the same time, the separated coarser particles are discharged downwardly along the wall of the classifier and are returned to the grinding elements of the pulverizing zone by way of the discharge ducts 7.

With the construction described, the air-borne pulverized fuel mixture passing through the gravity classification space 6 is separated into individual streams leading to each of the classifiers 3. Since the volume of air-borne pulverized fuel delivered to the classifiers 3 can be adjusted by selected positioning of the vanes 4, the distribution of air-borne pulverized fuel to each burner of the furnace served by the pulverizer can have a selected proportion of the total air-borne pulverized fuel produced in the pulverizer. It will be understood that adjustment of the vanes 4 will not only influence the total volume of air-borne pulverized fuel entering each classifier but will also change the fineness characteristics of the mixture discharged through the duct 5 from the individual classifier.

In addition to the advantageous selected distribution of the pulverized fuel and air streams leading to the burners accomplished by the present invention, the use of multiple classifiers in the pulverizer saves space without a corresponding reduction in the efficiency of classification. It is well known that the greater the ratio of length to diameter in the centrifugal classifier, the greater the efficiency of classification becomes. Thus, with the construction described, the multiple classifiers can be constructed to a more efficient length to diameter ratio within the usual spaced provided for classification within a pulverizer.

While in accordance with the provisions of the statutes I have illustrated and described herein the best form and mode of operation of the invention now known to me, those skilled in the art will understand that changes may be made in the form of the apparatus disclosed without departing from the spirit of the invention cov-

ered by my claims, and that certain features of my invention may sometimes be used to advantage without a corresponding use of other features.

What is claimed is:

1. Apparatus for pulverizing solid materials comprising a housing, means for feeding raw material to be pulverized to said housing, means for grinding said raw material in the lower portion of said housing, means defining more than two outlet openings in the upper portion of said housing, means for passing a stream of carrier fluid through said housing to entrain pulverized material from said grinding zone and to move said entrained material upwardly toward said outlet opening means, a plurality of stationary centrifugal classifying means in the upper portion of said housing, one of said stationary classifying means interposed in the stream of carrier fluid entrained material passing to each of said outlet opening means, and means for regulating the quantity of carrier fluid passing through each of said classifying means including a plurality of circumferentially spaced pivotably adjustable vanes disposed in the wall of each of said separate classifiers, said means for regulating conjointly the fineness of pulverized material discharging from each of said classifying means.

2. Apparatus for pulverizing solid materials comprising a housing, means for feeding raw material to be pulverized to said housing, means for grinding said solid material in the lower portion of said housing, means defining more than two outlet openings in the upper portion of said housing, means for passing a stream of carrier fluid through said housing to entrain pulverized material from said grinding zone and to move said entrained material upwardly toward said outlet opening means, and centrifugal classifying means in the upper portion of said housing, said classifying means including a separate classifier positioned to discharge carrier medium and entrained pulverized materials to each of said outlet means and to return oversized solid materials to said grinding zone, and a plurality of circumferentially spaced pivotably adjustable vanes disposed in the wall of each of said separate classifiers to conjointly regulate the fineness of the entrained pulverized material and the rate of carrier fluid flow discharged through each of said outlet means.

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