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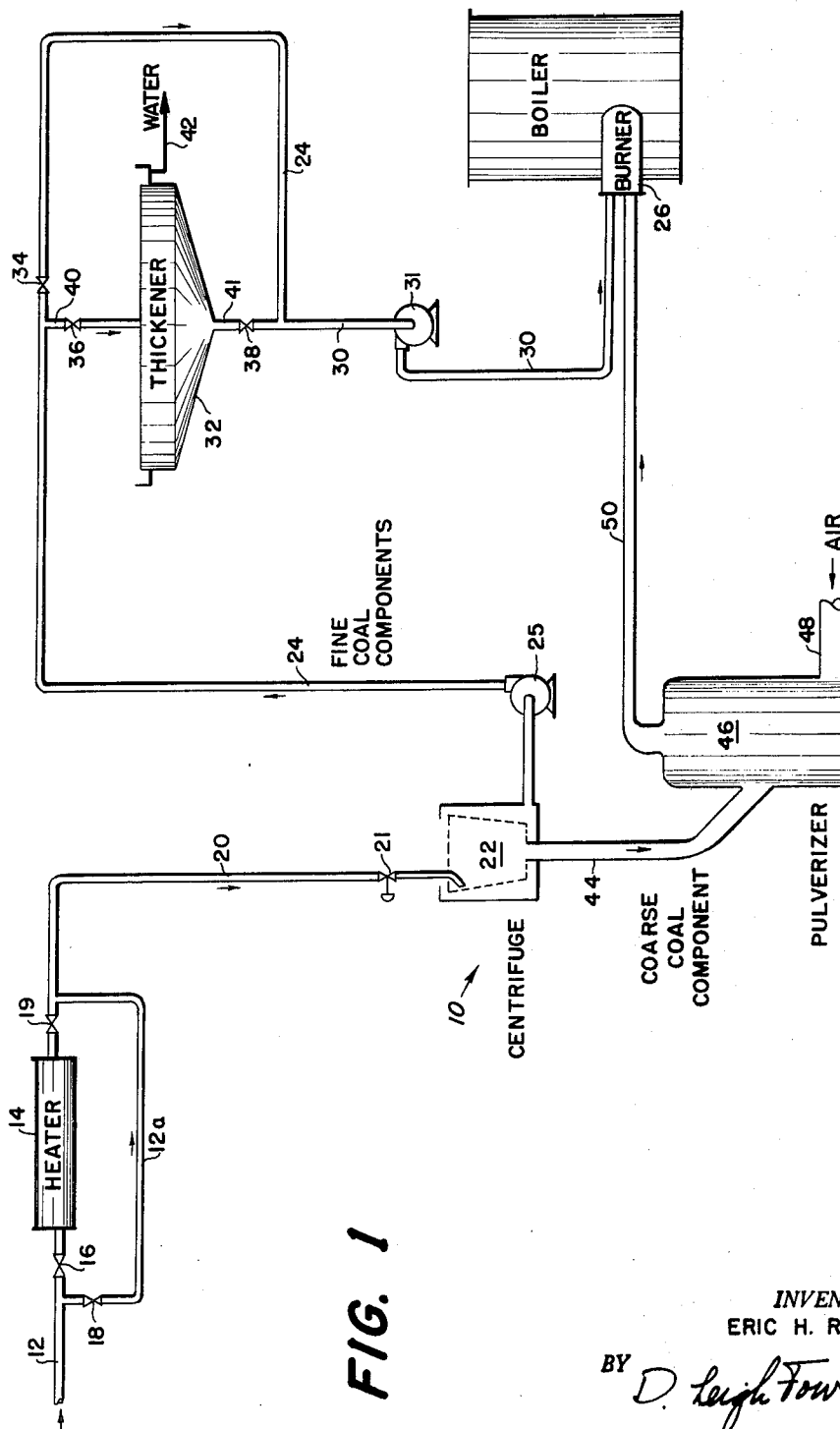
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PROCESS FOR BURNING COAL IN A PULVERIZED FUEL BURNER

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2 Sheets-Sheet 1

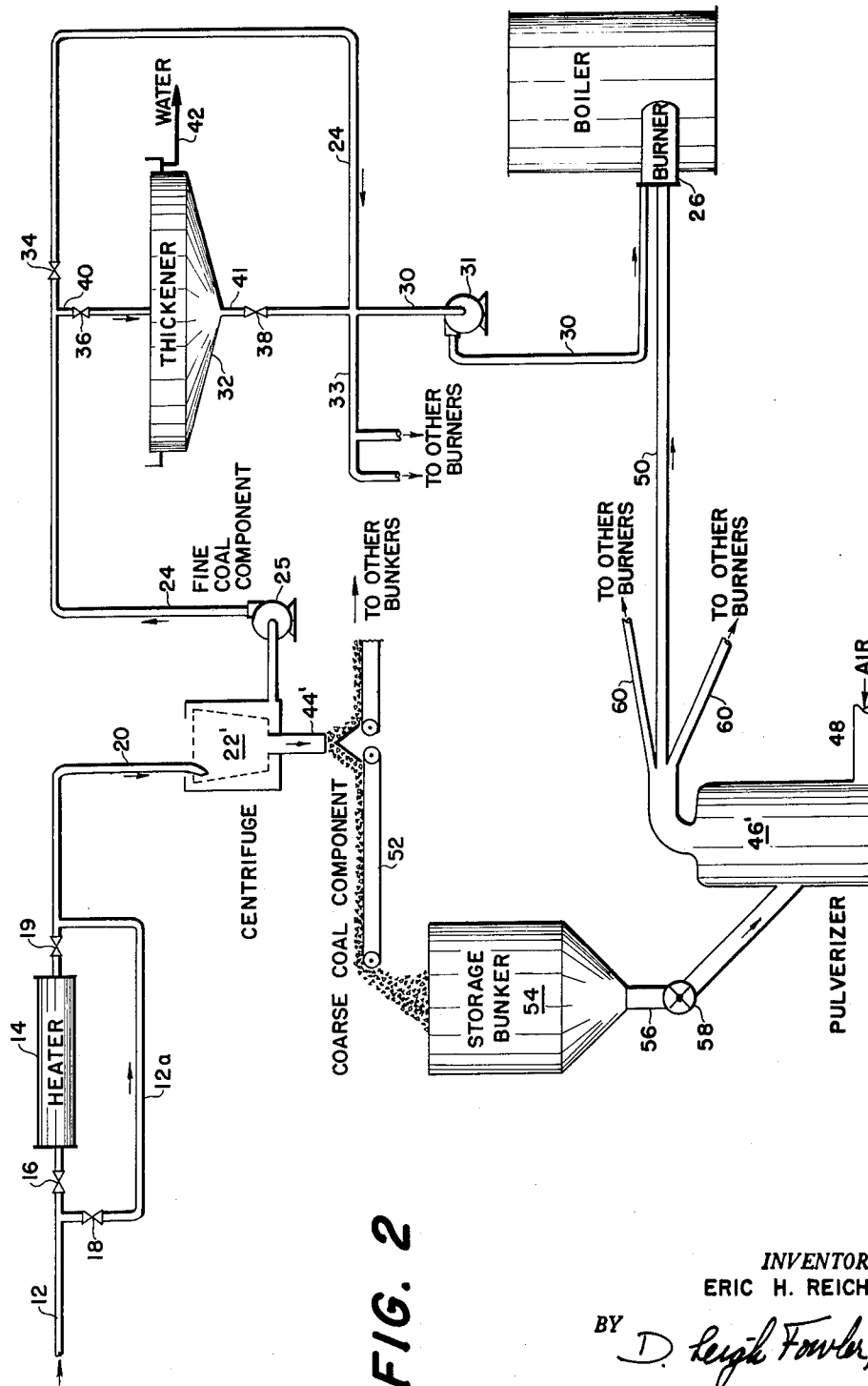


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PROCESS FOR BURNING COAL IN A PULVERIZED FUEL BURNER

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13 Claims. (Cl. 110—7)

This invention relates to a process for burning different sized particulate coal in a pulverized fuel burner and more particularly to a process for efficiently reducing the size of large particles of coal suspended in a coal-water mixture that contains a relatively large percentage of fine coal particles.

In copending U.S. patent application Serial No. 9,884, filed February 19, 1960, entitled "Preparing Coal for Transportation by Pipeline," now abandoned, and in copending U.S. patent application Serial No. 134,631, filed August 29, 1961, entitled, "Transportation of Coal by Pipeline," now Patent No. 3,168,350, each of which is assigned to the assignee of this document, there are described methods of transporting different sized coal particles in a coal-water mixture over long distances through pipelines. One of the major advantages of utilizing the methods described in the aforesaid copending patent applications is the ease of handling of the coal-water mixture after it emerges from a long distance pipeline. Because of this ease of handling, new methods of burning the transported coal provide substantial savings in the cost of equipment at the outlet of the pipeline.

In properly designed combustion terminals at the end of a long distance pipeline, the coal-water mixture transported according to the teachings of the aforesaid copending U.S. patent applications can be burned directly without preliminary dewatering or treating of the mixture. Thus, in many newly erected installations, the coal-water mixture may be subjected to direct combustion in fuel burners designed with the characteristics of the mixture in mind.

In older installations, having certain specified requirements for the maximum size of the coal particles that can be burned and the maximum amount of moisture that can be present with the particles that support combustion, the economic incentive for providing pipeline transportation of coal to these installations can depend, to a large degree, upon the efficiency with which the incoming coal-water mixture from the pipeline can be transformed into material that can be burned in the existing burner installation. The present invention is directed to a novel process for burning a coal-water mixture in a pulverized fuel burner with a minimum of handling and recirculation of the coal-water mixture.

The present invention contemplates separating the coal-water mixture emerging from the outlet of the pipeline into two components. The separation is accomplished mechanically by means of a centrifuge or the like. One component emerging from the separating means contains the large coal particles and a relatively small amount of water. The other component emerging from the separating means contains the fine coal of the mixture suspended in a relatively large percentage of the water from the incoming coal-water mixture. The coarse coal component is conducted into a pulverizer where the coarse coal particles are reduced in size and where they are entrained in a flowing stream of air to be conducted to a pulverized fuel burner. The fine coal particles, in their liquid stream, can either be conducted directly to the pulverized fuel burner or else they can be conducted to a thickener where a portion of the water is separated from the fine coal component before the fine coal is conducted into the pulverized fuel burner.

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The separating means for dividing the coal-water mixture emerging from the pipeline into a coarse coal component and a fine coal component is designed so that substantially all the fine coal particles smaller than a predetermined size are separated from the coarse coal particles and are passed out of the separating means with the major portion of the water of the coal-water mixture. It has been found that a basket-type centrifuge can be effectively utilized to accomplish the desired separation of the incoming mixture into coarse and fine coal components.

In some instances, depending upon the temperature of the mixture emerging from the pipeline and depending upon its concentration, it is desirable to heat the coal-water mixture emerging from the pipeline before separation of the material into coarse and fine coal components takes place in order to improve the separation process. The heating of the coal-water mixture may be accomplished by a separate, independent heater, or it may be accomplished by utilizing flue gases from the pulverized fuel burner to provide heat to the incoming mixture.

With the foregoing considerations in mind, it is a primary object of the present invention to provide an improved method of burning the coal within a mixture of water and coal, having a spectrum of particle sizes, in a pulverized fuel burner.

Another object of this invention is to provide a method of introducing a coal-water mixture including coal having a relatively large percentage of fine particles into a pulverized fuel burner system in an efficient manner.

Another object of this invention is to provide a process for separating the larger sized particles from a coal-water mixture in order to comminute the larger sized coal particles to a size that is suitable for efficient combustion in a pulverized fuel burner.

These and other objects of this invention will become apparent as this description proceeds in conjunction with the accompanying drawings.

In the drawings:

FIGURE 1 is a schematic illustration of a system for burning a coal-water mixture containing coal having a spectrum of particle sizes in a conventional pulverized fuel burner.

FIGURE 2 is a schematic illustration of a modified system similar to that of FIGURE 1.

Referring to FIGURE 1, a coal-water mixture is conducted into the combustion system 10 through a pipeline 12. Pipeline 12 may either be a long distance, cross country pipeline through which the coal-water mixture has been transported, or it may be a relatively short section of pipeline that transports the coal-water mixture from an intermediate storage means (not shown) into which the long distance, cross country pipeline has emptied. Depending upon the origin of pipeline 12, and upon the type of storage that the coal-water mixture may have undergone, the coal-water mixture entering the combustion system 10 through pipeline 12 may vary in solids concentration from about 50 percent by weight to about 75 percent by weight of coal particles suspended in water. The coal particles suspended in water have a spectrum of particle sizes ranging from particles that are retained on a 14 mesh Tyler Standard screen to particles that will pass through a 325 mesh Tyler Standard screen.

The coal-water mixture entering the combustion system 10 through pipeline 12 may optionally be heated within heater 14. To conduct the mixture to heater 14, valve 16 within pipeline 12 is opened and valve 18 within pipeline bypass branch 12a is closed. The heated mixture emerges from heater 14 into pipeline 20 through open valve 19. In the event that it is not desired to heat the coal-water mixture entering the combustion system through pipeline 12, valves 16 and 19 are closed, and valve 18 is opened

to permit the mixture to enter pipeline 20 through the bypass branch 12a of pipeline 12.

The coal-water mixture passing through pipeline 20 has a predetermined weight ratio of coal to water as it enters the centrifuge 22. A control valve 21 controls the flow of the mixture to centrifuge 22 and thereby controls the overall rate of fuel consumption of the system 10. Centrifuge 22 is preferably of the basket type which separates the particulate coal within the coal-water mixture into a coarse coal component and a fine coal component. The coarse coal component contains the large sized coal particles and a relatively small amount of water so that the coal-to-water weight ratio of the coarse coal component is substantially greater than the predetermined coal-to-water weight ratio of the mixture within pipeline 20. The fine coal component emerging from centrifuge 22 contains the small coal particles and the major portion of the water from the coal-water mixture so that the coal-to-water weight ratio of the fine coal component is substantially smaller than the predetermined weight ratio of the coal-water mixture entering the centrifuge 22.

It is essential that the centrifuge 22, or its mechanical equivalent, be of the type which permits separation of some fine coal from the solids component along with the liquid rather than being the type of centrifuge (solid bowl type) which separates substantially all solids from all liquid introduced therein.

The fine coal component emerges from the centrifuge 22 and is pumped through conduit 24 by pump 25. Depending upon combustion conditions, the fine coal component can either be conducted directly to the pulverized fuel burner 26 through conduits 24 and 30, or the fine coal component can first be introduced into a thickener 32 where a substantial portion of the water in the fine coal component can be separated from the coal particles. To conduct the fine coal component directly to the pulverized fuel burner 26, the valve 34 within conduit 24 is opened and the valves 36 and 38 within thickener conduits 40 and 41 respectively are closed. On the other hand, to utilize thickener 32, valve 34 is closed and thickener conduit valves 36 and 38 are opened so that the fine coal component can enter thickener 32 and be discharged therefrom into conduit 30. A pump 31 is provided to move the fine coal component through conduit 30 to the pulverized fuel burner. The speed at which pump 31 is operated controls the rate of feed of the fine coal component to the pulverized fuel burner 26.

Thickener 32 may be of any well known type such as a clariflocculator, a filter, or a simple static settling tank. When a clariflocculator is utilized, a flocculating agent may be added to the thickener to sufficiently concentrate the fine coal component. Thickener 32 is provided with a water discharge conduit 42 through which the water separated from the fine coal component is eliminated.

The coarse coal component emerges from centrifuge 22 through a standpipe 44. Since the coarse coal component contains only a small amount of water, some method must be provided to convey the coarse coal component to pulverizer 46 that permits movement of relatively dry solids. In FIGURE 1, coal is permitted to fall by gravity from centrifuge 22, located above pulverizer 46, through a relatively large diameter standpipe 44 into pulverizer 46.

The pulverizer 46 is a conventional air-swept pulverizer unit, such as a bowl mill of the type disclosed in U.S. Patent No. 2,079,155, or a ball and ring mill of the type disclosed in U.S. Patent No. 2,670,138, utilized with a pulverized fuel burner. Within pulverizer 46 the large particles of coal in the coarse coal component are comminuted so that they may be burned within the pulverized fuel burner 26. In conventional fashion, heated air enters the pulverizer through conduit 48 and serves the dual purpose of further reducing the moisture of the coal within pulverizer 46 and entraining the pulverized coal comminuted within pulverizer 46 so that the pulver-

ized coal can be pneumatically conveyed through conduit 50 from the pulverizer 46 into the pulverized fuel burner 26.

The system of FIGURE 1 is particularly adapted for use with pulverized fuel burners so constructed that each burner has an individual pulverizer associated therewith that comminutes the coal for that particular burner. In such a system, the centrifuge 22 can be located physically near to the pulverizer 46 and can be of such capacity that it handles only a quantity of coal-water mixture sufficient to fire the associated burner. The coal-water mixture will, in such cases, be conducted by pipeline 20 to the vicinity of the burner where the centrifuge 22 is located. Since the centrifuge 22 handles only fuel for a single burner in this system, valve 21 that controls flow to the centrifuge 22 is, in effect, a fuel flow control valve for the burner 26. The combustion taking place in burner 26 can be regulated by control valve 21.

In most existing installations, the pulverizer fuel feed arrangement is such that there is a single coal storage bin associated with each pulverizer or group of pulverizers and the pulverizers service more than one burner. In these existing installations, one or more feed belts originating at a feed point located centrally relative to the bin and pulverizers may service several boilers with dry coal. In order to make use of this existing arrangement, a centrally located centrifuge or centrifuge group can be utilized to practice the present invention by feeding the coarse coal component onto the feed belts for distribution to the several storage bins or bunkers.

In practicing the present invention in an existing installation that has one or more pulverizers that service several burners and wherein coal is fed to a plurality of bunkers from a central feed point, it is often desirable to locate the centrifuges at a point from whence the coarse coal component can be fed to the existing conveyor belts and storage bunkers. The normal means to control flow for this component are used to control feed to the individual pulverizers. The fine coal component would again be processed in a system as described in FIGURE 1.

FIGURE 2 shows a combustion system in which the pulverizer is designed to service several pulverized fuel burners and in which a centrally located centrifuge feeds several bunkers and pulverizers, although only a single bunker and pulverizer are shown. Only one burner is illustrated in FIGURE 2, but others can be fed from the same pulverizer. Likewise, the several burners can be fed by the fine coal component emerging from the centrifuge as a coal-water mixture.

The system shown in FIGURE 2 is generally similar to that shown in FIGURE 1. Many of the units in FIGURE 2 are identical to those shown in FIGURE 1. FIGURE 2 will be described in detail only insofar as it differs materially from previously described FIGURE 1. The components of FIGURE 2 that are identical to those of FIGURE 1 are designated by reference numerals identical to those utilized in FIGURE 1. Other components of FIGURE 2 that are very similar to those shown in FIGURE 1, but which are slightly modified, have been designated with reference numerals that correspond to the numerals of the components in FIGURE 1 but have prime suffixes affixed thereto. The components of the system of FIGURE 2 that do not appear at all in FIGURE 1 have been given new reference numerals.

Referring to FIGURE 2, the pipeline 12 introduces a coal-water mixture into the system. The coal-water mixture can optionally be passed through a heater 14 by opening valve 16 in pipeline 12 and by closing valve 18 in pipeline bypass branch 12a. The mixture emerges from heater 14 into pipeline 20 through open valve 19. If it is desired to bypass heater 14, valves 16 and 19 are closed and valve 18, within bypass pipeline branch 12a, is opened.

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The coal-water mixture from pipeline 20 enters centrifuge 22'. Centrifuge 22' is located centrally relative to the pulverizers fed with the centrifuge product. Centrifuge 22' is generally similar to centrifuge 22 previously described in connection with FIGURE 1. It is a basket-

type centrifuge which may be operated so that some fine solid material leaves the centrifuge with the effluent separated from the coal-water mixture. The coarse component has a much smaller amount of water leaving centrifuge 22' with it. Centrifuge 22' differs from centrifuge 22 of FIGURE 1 in that it has a higher throughput capacity since centrifuge 22' handles the fuel for several pulverized fuel burners rather than handling only fuel for a single burner as in the system of FIGURE 1.

As in the system of FIGURE 1, the fine coal component leaves centrifuge 22' of FIGURE 2 and is pumped through conduit 24 by pump 25. The fine coal component can bypass thickener 32 and enter conduits 30 and 33 through which it is conducted to the pulverized fuel burners.

The fine coal component can also be passed through thickener 32 by closing valve 34 in conduit 24 and by opening valve 36 in thickener conduit 40. By opening valve 38 in thickener outlet conduit 41, the fines component that has had a portion of the water removed therefrom in thickener 32 can be passed into conduits 30 and 33. The water removed from the fines component leaves thickener 32 through conduit 42. The pump 31 located within conduit 30 controls the rate of feed of the fine coal component to burner 26 as it moves the fines component through conduit 30 to pulverized fuel burner 26. The feed conduits to other burners connected to conduit 33 can also be provided with pumps (not shown) similar to pump 31 to feed and control the flow of the fine coal component to other pulverized fuel burners (not shown) in the combustion system.

In FIGURE 2, the coarse coal component leaves centrifuge 22' through outlet 44'. Since the centrally located centrifuge 22' is of higher capacity than centrifuge 22 of FIGURE 1, and since the centrifuge 22' is located at a greater distance from the pulverizers than the centrifuge 22 of FIGURE 1, a portion of the coarse coal component discharged from outlet 44' is conveyed to pulverizer 46' by means of a conveyor belt 52 and a storage bunker 54. Another bunker (not shown) can be utilized to store and convey a portion of the coarse coal component to another pulverizer (not shown). The coarse coal component is stored in storage bunker 54 from where it is admitted into pulverizer 46' in controlled quantities through bunker conduit 56 and control valve 58. The bunker and pulverizer (not shown) fed by belt 53 are similarly arranged. The system of FIGURE 2 has no valve similar to control valve 21 of FIGURE 1 which controls the flow of fuel to the centrifuge 22 and thence to the pulverized fuel burner 26. Rather, in the system of FIGURE 2, the centrifuge 22' continually operates on all the coal-water mixture introduced to it and the coarse coal component leaving centrifuge 22' is stored within storage bunkers similar to bunker 54.

The amount of coal admitted into pulverizer 46' is controlled by control valve 58 which regulates the rate of withdrawal of the coarse coal component from storage bunker 54. The pulverizer 46' that receives coal from storage bunker 54 is a high capacity pulverizer that may be utilized to serve several pulverized fuel burners. While a single pulverizer 46' is shown in FIGURE 2, a group of several pulverizers centrally located adjacent to each other can perform the same function as high capacity pulverizer 46'. Within pulverizer 46', the coarse coal component is comminuted and entrained in air conducted into pulverizer 46' through conduit 48. The entrained pulverized coal leaves pulverizer 46' through conduit 50 to enter pulverized fuel burner 26. Other exit conduits 60 are provided in pulverizer 46' to feed other pulverized fuel burners (not shown) of the system.

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It will be noted that the systems of FIGURES 1 and 2 are generally similar to each other in that the incoming coal-water mixture is separated in a basket-type centrifuge, the fine coal component is directed to the pulverized fuel burner, and the coarse coal component is directed to a pulverizer where it is comminuted and entrained for pneumatic conveyance to the pulverized fuel burner. The systems of FIGURES 1 and 2 differ in the capacity and arrangement of the components, the system of FIGURE 1 being particularly adapted for pulverized fuel burners that have individual pulverizers associated with each burner, while the system of FIGURE 2 is adapted for use with a centrally located centrifuge and with pulverizers that feed several burners.

With reference to the foregoing description of the pulverized fuel combustion systems, the following are some examples of preferred combustion techniques to be practiced in accordance with the principles of the present invention.

Example I

A coal-water mixture containing 65 percent by weight coal is introduced into the system through pipeline 12 and caused to bypass heater 14 so that it enters the centrifuge 22 or 22'. This coal-water mixture with a coal water weight ratio of 65/35 contains coal particles that will all pass through a 4 mesh Tyler Standard screen. Approximately 45 percent by weight of the coal particles are of a size that would be retained on a 48 mesh Tyler Standard screen and approximately 55 percent by weight of the coal particles are of a size that will pass through a 48 mesh Tyler Standard screen.

Within centrifuge 22 or 22', the coal-water mixture is separated so that the coarse coal component contains substantially all +48 mesh coal particles and the concentration of the coarse coal component is approximately 86 percent by weight coal and approximately 14 percent by weight water. The fine coal component emerging from the centrifuge 22 or 22' contains substantially all -48 mesh coal particles. The fine coal component contains approximately 48 percent by weight coal and 52 percent by weight water. The fine coal component is conducted directly to the pulverized fuel burner 26 through conduits 24 and 30 thereby bypassing thickener 32. The coarse coal component is pulverized within pulverizer 46 or 46', entrained by air entering pulverizer 46 or 46' through conduit 48 and conducted to the pulverized fuel burner 26 through conduit 50.

Example II

A coal-water mixture entering the combustion system through pipeline 12 contains 60 percent by weight of coal particles and 40 percent by weight of water. The coal particles are of a size that will all pass through a 4 mesh Tyler Standard screen while 57 percent by weight of the coal particles will remain on a 100 mesh Tyler Standard screen and 43 percent of the particles will pass through a 100 mesh Tyler Standard screen. The mixture bypasses heater 14 and directly enters centrifuge 22 or 22'.

Centrifuge 22 or 22' is operated so that, upon separation, the coarse coal component contains substantially all +100 mesh coal particles and consists of 92 percent by weight coal and 8 percent by weight water. The fine coal component, on the other hand, contains substantially all -100 mesh coal and has 39 percent by weight coal and 61 percent by weight water. The coarse coal component is conducted into pulverizer 46 or 46' where it is comminuted and entrained in an air stream to be carried to burner 26. The fine coal component, on the other hand, is conducted through conduit 40 into thickener 32. The thickener 32 separates a substantial amount of clear water from the fine coal component. Upon emerging from thickener 32, the fine coal component contains approximately 50 percent by weight coal and 50 percent by weight water and this component is conducted through conduit 30 to the pulverized fuel burner 26.

Example III

A coal-water mixture containing 60 percent by weight coal particles and 40 percent by weight water is introduced into the combustion system through pipeline 12. The coal-water mixture contains particles which will all pass through a 4 mesh Tyler Standard screen. Approximately 69 percent of the coal particles will remain on a 200 mesh Tyler Standard screen and approximately 31 percent by weight of the coal particles will pass through a 200 mesh Tyler Standard screen. The coal-water mixture from pipeline 12 is introduced into heater 14 where the temperature of the mixture is raised to approximately 200° F. to facilitate separation of the mixture within centrifuge 22 or 22'.

The centrifuge 22 or 22' is operated so that the coarse coal component emerging from the centrifuge contains substantially all +200 mesh particles and has approximately 84 percent by weight coal and 16 percent by weight water. The fine coal component emerging from centrifuge 22 contains substantially all -200 mesh coal particles and contains approximately 36 percent by weight coal and approximately 64 percent by weight water. The coarse coal component is directed to pulverizer 46 or 46' where it is comminuted and entrained in an air stream to be carried to the pulverized fuel burner 26.

The fine coal component is introduced into thickener 32. Enough water is separated from the fine coal component within thickener 32 so that the fine coal component emerges from thickener 32 and enters the pulverized fuel burner 26 containing 50 percent by weight coal and 50 percent by weight water.

It will be appreciated from the foregoing examples that operation of the combustion system of the present invention is flexible and can be varied according to initial concentration of the coal particles, and according to the final size consist required in the pulverized fuel burner 26. The present invention permits a portion of the very fine coal particles within the mixture to bypass pulverizer 46 and enter the pulverized fuel burner directly. Accordingly, only the coarser coal particles need pass through pulverizer 46 and the overall capacity of the system is increased.

According to the provisions of the patent statutes, I have explained the principle, preferred construction, and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiments. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than has been specifically illustrated and described.

I claim:

1. A process for burning coal in a pulverized fuel burner comprising

conducting a coal-liquid mixture in the form of a slurry containing coal having a spectrum of particle sizes and having a predetermined coal-to-liquid weight ratio to a separating means, separating said coal-liquid mixture into first and second components, said first component containing large sized coal particles and having a coal-to-liquid weight ratio greater than said predetermined ratio, said second component containing small sized coal particles and having a coal-to-liquid weight ratio less than said predetermined ratio, conducting said first component to a pulverizing means and pulverizing said large sized coal particles to reduce the size of said large sized coal particles, conducting said second component to said pulverized fuel burner, conducting the pulverized particles of said first component from said pulverizing means to said pulverized fuel burner, and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

2. A process for burning coal in a pulverized fuel burner comprising

conducting a coal-liquid mixture in the form of a slurry containing coal having a spectrum of particle sizes and having a predetermined coal-to-liquid weight ratio to a separating means, separating said coal-liquid mixture into first and second components, said first component containing large sized coal particles and having a coal-to-liquid weight ratio greater than said predetermined ratio, said second component containing small sized coal particles and having a coal-to-liquid weight ratio less than said predetermined ratio, conducting said first component to a pulverizing means and pulverizing said large sized coal particles to reduce the size of said large sized coal particles, conducting said second component to a thickening means and thickening said second component to remove a portion of the liquid from said second component and thereby increase the coal-to-liquid weight ratio of said second component, conducting said second component emerging from said thickening means to said pulverized fuel burner, conducting the pulverized particles of said first component from said pulverizing means to said pulverized fuel burner, and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

3. A process for burning coal in a pulverized fuel burner comprising

conducting a coal-liquid mixture in the form of a slurry to a heating means to heat said mixture to a predetermined minimum temperature, conducting said coal-liquid mixture containing coal having a spectrum of particle sizes and having a predetermined coal-to-liquid weight ratio from said heating means to a separating means, separating said coal-liquid mixture into first and second components, said first component containing large sized coal particles and having a coal-to-liquid weight ratio greater than said predetermined ratio, said second component containing small sized coal particles and having a coal-to-liquid weight ratio less than said predetermined ratio, conducting said first component to a pulverizing means and pulverizing said large sized coal particles to reduce the size of said large sized coal particles, conducting said second component to said pulverized fuel burner, conducting the pulverized particles of said first component from said pulverizing means to said pulverized fuel burner, and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

4. A process for burning coal in a pulverized fuel burner comprising

conducting a coal-water mixture in the form of a slurry containing coal having a spectrum of particles sizes and having a predetermined coal-to-water weight ratio to a basket-type centrifuge, separating said coal-water mixture within said basket-type centrifuge into first and second components, said first component containing large sized coal particles and having a coal-to-water weight ratio greater than said predetermined ratio, said second component containing small sized coal particles and having a coal-to-water weight ratio less than said predetermined ratio, conducting said first component to a pulverizer and pulverizing said large sized coal particles to reduce the size of said large sized coal particles, conducting said second component to said pulverized fuel burner,

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conducting the pulverized particles of said first component from said pulverizer to said pulverized fuel burner, and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

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5. A process for burning coal in a pulverized coal burner comprising

conducting a coal-water mixture in the form of a slurry containing coal having a spectrum of particle sizes and having a predetermined coal-to-water weight ratio to a basket-type centrifuge,

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separating said coal-water mixture within said basket-type centrifuge into first and second components, said first component containing large sized coal particles and having a coal-to-water weight ratio greater than said predetermined ratio,

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said second component containing small sized coal particles and having a coal-to-water weight ratio less than said predetermined ratio,

conducting said first component to a pulverizer and pulverizing said large sized coal particles to reduce the size of said large sized coal particles,

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conducting said second component to a thickening means and thickening said second component to remove a portion of the water from said second component and thereby increase the coal-to-water weight ratio of said second component,

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conducting said second component emerging from said thickening means to said pulverized fuel burner,

conducting the pulverized particles of said first component from said pulverizer to said pulverized fuel burner, and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

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6. A process for burning coal in a pulverized fuel burner comprising

conducting a coal-water mixture in the form of a slurry to a heating means to heat said mixture to a predetermined minimum temperature,

conducting said coal-water mixture containing coal having a spectrum of particle sizes and having a predetermined coal-to-water weight ratio from said heating means to a basket-type centrifuge,

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separating said coal-water mixture within said basket-type centrifuge into first and second components, said first component containing large sized coal particles and having a coal-to-water weight ratio greater than said predetermined ratio,

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said second component containing small sized coal particles and having a coal-to-water weight ratio less than said predetermined ratio,

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conducting said first component to a pulverizer and pulverizing said large sized coal particles to reduce the size of said large sized coal particles,

conducting said second component to said pulverized fuel burner,

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conducting the pulverized particles of said first component from said pulverizer to said pulverized fuel burner,

and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

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7. A process for burning coal in a pulverized fuel burner comprising

conducting a coal-water mixture in the form of a slurry containing from about 50 percent to about 75 percent by weight coal that has a spectrum of particle sizes ranging from on 14 mesh Tyler Standard screen particles to through 325 mesh Tyler Standard screen particles to a basket-type centrifuge,

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separating said coal-water mixture within said basket-type centrifuge into first and second components,

said first component containing substantially all +100 mesh coal particles and containing from about 80 percent to about 95 percent by weight coal particles,

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said second component containing substantially all -48 mesh coal particles and containing from about 35 percent to about 55 percent by weight coal particles, conducting said first component to a pulverizer and pulverizing said coal particles in said first component to reduce the size of said +48 mesh coal particles, conducting said second component to said pulverized fuel burner,

conducting the pulverized particles of said first component from said pulverizer to said pulverized fuel burner,

and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

8. A process for burning coal in a pulverized fuel burner comprising

conducting a coal-water mixture in the form of a slurry containing from about 50 percent to about 75 percent by weight coal that has a spectrum of particle sizes ranging from on 14 mesh Tyler Standard screen particles to through 325 mesh Tyler Standard screen particles to a basket-type centrifuge,

separating said coal-water mixture within said basket-type centrifuge into first and second components,

said first component containing substantially all +100 mesh coal particles and containing from about 80 percent to about 95 percent by weight coal particles,

said second component containing substantially all -48 mesh coal particles and containing from about 35 percent to about 55 percent by weight coal particles,

conducting said first component to a pulverizer and pulverizing said coal particles in said first component to reduce the size of said +48 mesh coal particles,

conducting said second component to a thickener and thickening said second component to remove a substantial portion of the water contained therein,

removing said second component from said thickener so that said second component contains from about 45 percent to about 65 percent by weight particulate coal and conducting said second component so thickened to said pulverized fuel burner,

conducting the pulverized particles of said first component from said pulverizer to said pulverized fuel burner,

and burning said thickened second component and said pulverized particles of said first component in said pulverized fuel burner.

9. A process for burning coal in a pulverized fuel burner comprising

conducting a coal-water mixture in the form of a slurry through a heater to heat said mixture to approximately 200° F.,

conducting said coal-water mixture containing from about 50 percent to about 75 percent by weight coal that has a spectrum of particle sizes ranging from on 14 mesh Tyler Standard screen particles to through 325 mesh Tyler Standard screen particles from said heater to a basket-type centrifuge,

separating said coal-water mixture within said basket-type centrifuge into first and second components,

said first component containing substantially all +100 mesh coal particles and containing from about 80 percent to about 95 percent by weight coal particles,

said second component containing substantially all -48 mesh coal particles and containing from about 35 percent to about 55 percent by weight coal particles,

conducting said first component to a pulverizer and pulverizing said coal particles in said first component to reduce the size of said +48 mesh coal particles,

conducting said second component to a thickener and thickening said second component to remove a substantial portion of the water contained therein,

removing said second component from said thickener so that said second component contains from about 45 percent to about 65 percent by weight particulate

coal and conducting said second component so thickened to said pulverized fuel burner,

conducting the pulverized particles of said first component from said pulverizer to said pulverized fuel burner,

and burning said thickened second component and said pulverized particles of said first component in said pulverized fuel burner.

10. A process for burning coal in a pulverized fuel burner comprising

conducting a coal-water mixture in the form of a slurry containing from about 50 percent to about 75 percent by weight coal that has a spectrum of particle sizes ranging from on 14 mesh Tyler Standard screen particles to through 325 mesh Tyler Standard screen particles to a basket-type centrifuge,

separating said coal-water mixture within said basket-type centrifuge into first and second components,

said first component containing substantially all +100 mesh coal particles and containing from about 80 percent to about 95 percent by weight coal particles,

said second component containing substantially all -48 mesh coal particles and containing from about 35 percent to about 55 percent by weight coal particles,

conducting said first component to a pulverizer and pulverizing said coal particles in said first component to reduce the size of said +48 mesh coal particles,

conducting said second component to a thickener and thickening said second component to remove a substantial portion of the water contained therein,

removing said second component from said thickener so that said second component contains from about 45 percent to about 65 percent by weight particulate

coal and conducting said second component so thickened to said pulverized fuel burner, conducting the pulverized particles of said first component from said pulverizer to said pulverized fuel burner,

and burning said thickened second component and said pulverized particles of said first component in said pulverized fuel burner.

10. A process for burning coal in a pulverized fuel burner having a single pulverizing means located adjacent said burner for feeding only said burner comprising conducting a coal-liquid mixture in the form of a slurry containing coal having a spectrum of particle sizes and having a predetermined coal-to-liquid weight ratio to a separating means positioned above said pulverizing means in proximity thereto, separating said coal-liquid mixture within said separating means into first and second components, said first component containing large sized coal particles and having a coal-to-liquid weight ratio greater than said predetermined ratio, said second component containing small sized coal particles and having a coal-to-liquid weight ratio less than said predetermined ratio, conducting said first component by gravity directly into said pulverizing means and pulverizing said large sized coal particles to reduce the size of said large sized coal particles, conducting said second component to said pulverized fuel burner, conducting the pulverized particles of said first component from said pulverizing means to said pulverized fuel burner, and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

11. A process for burning coal in a pulverized fuel burner having a single pulverizer located adjacent said burner for feeding only said burner comprising conducting a coal-water mixture in the form of a slurry containing from about 50 percent to about 75 percent by weight coal that has a spectrum of particle sizes ranging from on 14 mesh Tyler Standard screen particles to through 325 mesh Tyler Standard screen particles to a basket-type centrifuge positioned above said pulverizer in proximity thereto, controlling the rate of conduction of said coal-water mixture to said basket-type centrifuge to control the rate of combustion in said burner, separating said coal-water mixture within said basket-type centrifuge into first and second components, said first component containing substantially all +100 mesh coal particles and containing from about 80 percent to about 95 percent by weight coal particles, said second component containing substantially all -48 mesh coal particles and containing from about 35 percent to about 55 percent by weight coal particles, conducting said first component by gravity directly into said pulverizer and pulverizing said coal particles in said first component to reduce the size of said +48 mesh coal particles, conducting said second component to said pulverized fuel burner, conducting the pulverized particles of said first component from said pulverizer to said pulverized fuel burner, and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

12. A process for burning coal in one of a plurality of pulverized fuel burners comprising conducting a coal-liquid mixture in the form of a slurry containing coal having a spectrum of particle sizes and having a predetermined coal-to-liquid weight ratio to a high through-put capacity separating means

located nearer to said one burner than to a pulverizing means,

separating said coal-liquid mixture within said separating means into first and second components, said first component containing large sized coal particles and having a coal-to-liquid weight ratio greater than said predetermined ratio,

said second component containing small sized coal particles and having a coal-to-liquid weight ratio less than said predetermined ratio,

mechanically conducting at least a portion of said first component to a storage means,

conducting said first component at a controlled rate from said storage means and pulverizing said large sized coal particles to said pulverizing means to reduce the size of said large sized coal particles,

conducting said second component to said one pulverized fuel burner,

conducting the pulverized particles of said first component from said pulverizing means to said one pulverized fuel burner,

and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

13. A process for burning coal in one of a plurality of pulverized fuel burners comprising

conducting a coal-water mixture in the form of a slurry containing from about 50 percent to about 75 percent by weight coal that has a spectrum of particle sizes ranging from on 14 mesh Tyler Standard screen particles to through 325 mesh Tyler Standard screen particles to a high through-put capacity basket-type centrifuge located nearer to said one burner than to a pulverizer,

separating said coal-water mixture within said basket-type centrifuge into first and second components,

said first component containing substantially all +100 mesh coal particles and containing from about 80 percent to about 95 percent by weight coal particles,

said second component containing substantially all -48 mesh coal particles and containing from about 35 percent to about 55 percent by weight coal particles,

moving at least a portion of said first component from said basket-type centrifuge to a storage bunker by conveyor belt,

conducting said first component at a controlled rate from said storage bunker to said pulverizer and pulverizing said coal particles in said first component to reduce the size of said +48 mesh coal particles,

conducting said second component to said one pulverized fuel burner,

conducting the pulverized particles of said first component from said pulverizer to said one pulverized fuel burner,

and burning said second component and said pulverized particles of said first component in said pulverized fuel burner.

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