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APPARATUS FOR BURNING POWDERED FUEL

Filed March 21, 1925

Fig. 1

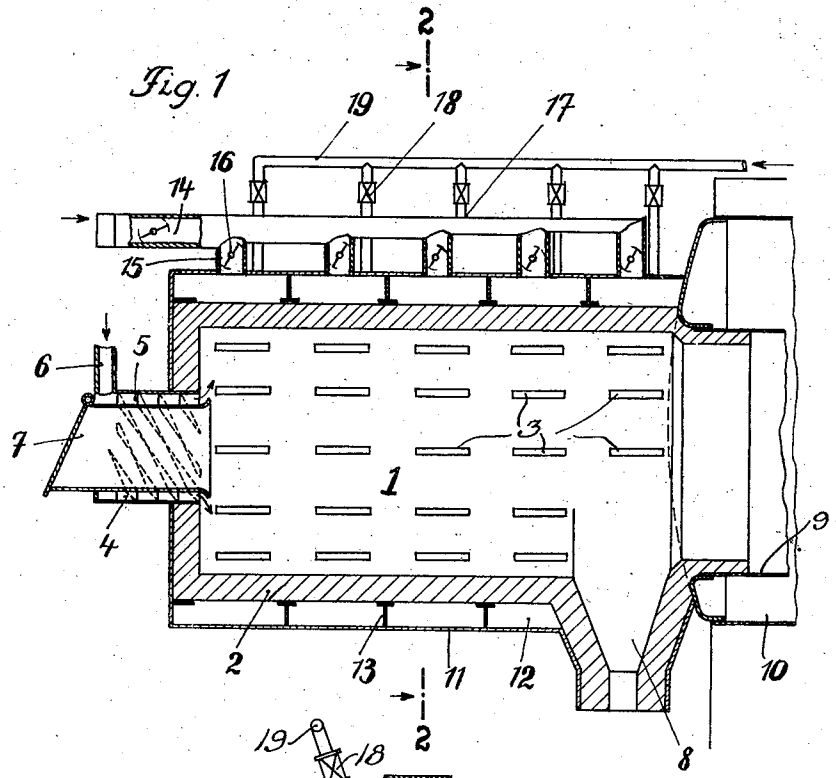
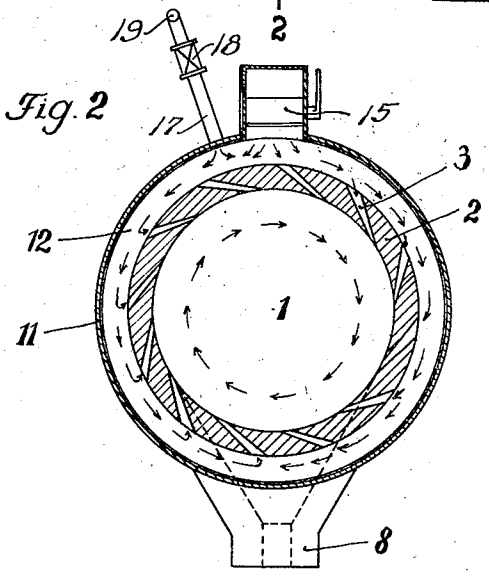


Fig. 2



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR BURNING POWDERED FUEL.

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My invention relates to improvements in apparatus for burning powdered fuel, and the object of the improvements is to provide an apparatus in which the efficiency of the combustion and the life of the apparatus are increased. With this object in view my invention consists in providing a combustion chamber which is provided at one end with means for supplying powdered fuel, and which has air for supporting combustion supplied thereto through passages made in the side wall of the chamber and in a direction circumferential of the jet of powdered fuel flowing through said chamber. In the preferred form of the invention the supply of the powdered fuel is made such as to impart to the jet of fuel a whirling path.

For the purpose of explaining the invention, an example embodying the same has been shown in the accompanying drawing, in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawing,

Fig. 1 is a sectional elevation of the apparatus as used in connection with a steam boiler, and

Fig. 2 is a section taken on the line 2—2 of Fig. 1.

In the example shown in the drawing the combustion apparatus comprises a combustion chamber 1 having a cylindrical wall 2 made from refractory material. At one end of the said chamber a tubular inlet 4 of annular cross-section opens into the combustion chamber, said inlet having an intake pipe 6 and including a helical vane 5 adapted to impart whirling movement to the fuel. The wall 2 of the chamber is provided with transverse passages 3 for the admission of air for supporting combustion, and in the example shown in the figures, and more particularly in Fig. 1, the direction of the said passages and the helical passage provided by the vane 5 are such that the air and the fuel are whirled around within the combustion chamber in the same direction. But I wish it to be understood that I do not limit myself to this feature, and that in some cases I dispose the said passages relatively to each other in such a way that air and fuel are whirled around in opposite directions. The central part of the tubular member 4 has a cross-sectional area such as to permit access therethrough to the combustion chamber, and it is normally closed by a gate 7. At the end opposite to the fuel inlet the combustion chamber is provided with a bottom discharge 8 for ashes, said discharge being located adjacent to the fire tube 9 of a steam boiler 10 adapted to be heated from the combustion chamber 1. The cylindrical wall 2 is provided with a jacket 11, and the annular chamber 12 thus provided is divided by partitions 13 into chambers, each of the chambers being connected with the air supply main 14 by a pipe 15 comprising regulating means such as butterfly valves 16. Further, each chamber has a supply of steam through a pipe 17 including a cock 18 and connected with a steam supply pipe 19. As appears more particularly from Fig. 1 the inner wall of the annular inlet 4 flares outwardly at its delivery end, so that the fuel is delivered into the combustion chamber in outward direction.

In the operation of the apparatus the fuel is admitted into the combustion chamber 1 through the pipe 4 along a spiral path, and when admitted to the said chamber it is thrown against the wall 2. Within the chamber it is mixed with the air admitted through the passages 3 in tangential direction, and the mixture flows along a helical line of small pitch towards the fire tube 9. By centrifugal action the solid particles of the fuel are thrown towards the wall of the combustion chamber, so that they move along a comparatively long path while being continuously brought into contact with fresh air. The volatile and readily ignited portions move through the axial portion of the combustion chamber where their path is comparatively short. The ashes are separated from the combustion gases only at the end of the combustion chamber and above the discharge 8, because earlier separation is prevented by the tangential current of air. The air admitted through the wall of the chamber has a cooling action, so that the wall is in a less degree subject to the destructive action of the heat. The steam admitted from the pipe 19 is heated within the wall 2, and it is decomposed within the said wall or immediately after entering the combustion chamber into hydrogen and oxygen, which chemical process likewise has a cooling action.

While in describing the invention reference has been made to a particular example

embodying the same I wish it to be understood that I do not limit myself to the construction shown in the drawing.

I claim:

1. An apparatus for the burning of powdered fuel comprising a cylindrical retort having tangential slots through its cylindrical wall, a jacket extending about said cylindrical slotted wall and forming an annular air space therewith, annular partitions for dividing said air space into adjoining compartments, an air supply under pressure to each compartment whereby to introduce air through the tangential slots and into the retort in a stream about the axis of the retort, and an annular inlet for the powdered material to the end of the retort and substantially coaxial therewith, said annular inlet having an out-turned inner portion for deflecting the powdered material toward the cylindrical slotted wall of the retort immediately on introduction of the material to the retort.

2. An apparatus for the burning of powdered fuel comprising a cylindrical retort having tangential slots through its cylindrical wall, a jacket extending about said cylindrical slotted wall and forming an annular air space therewith, annular partitions for dividing said air space into adjoining compartments, an air supply under pressure to each compartment whereby to introduce air through the tangential slots and into the retort in a stream about the axis of the retort, an annular inlet for the powdered material to the end of the retort and substantially coaxial therewith, said annular inlet having an out-turned inner portion for deflecting the powdered material toward the cylindrical slotted wall of the retort immediately on introduction of the material to the retort, and a spiral vane in said annular inlet for imparting to the powdered material prior to introduction into the retort a rotary movement about the axis of the retort.

3. An apparatus for the burning of powdered fuel comprising a cylindrical retort having tangential slots through its cylindrical wall, a jacket extending about said cylindrical slotted wall and forming an annular air space therewith, annular partitions for dividing said air space into adjoining compartments, an air supply under pressure to each compartment whereby to introduce air through the tangential slots and into the retort in a stream about the axis of the retort, an annular inlet for the powdered material to the end of the retort and substantially coaxial therewith, said annular inlet having an out-turned inner portion for deflecting the powdered material toward the cylindrical slotted wall of the retort immediately on introduction of the material to the retort, means in the inlet for imparting to the incoming powdered material a movement about the axis of the retort, and a steam inlet to the jacket compartments.

In testimony whereof I hereunto affix my signature.

EUGEN BURG.