May 30, 1933. E. G. BAILEY 1,911,543

DEVICE FOR MIXING AIR AND SOLID PARTICLES

Filed Oct. 11, 1927

Fig-1

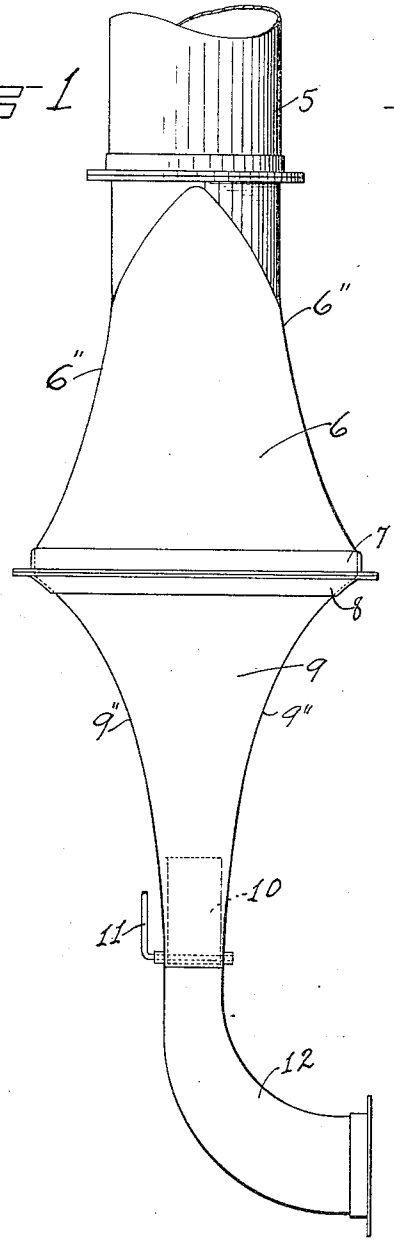
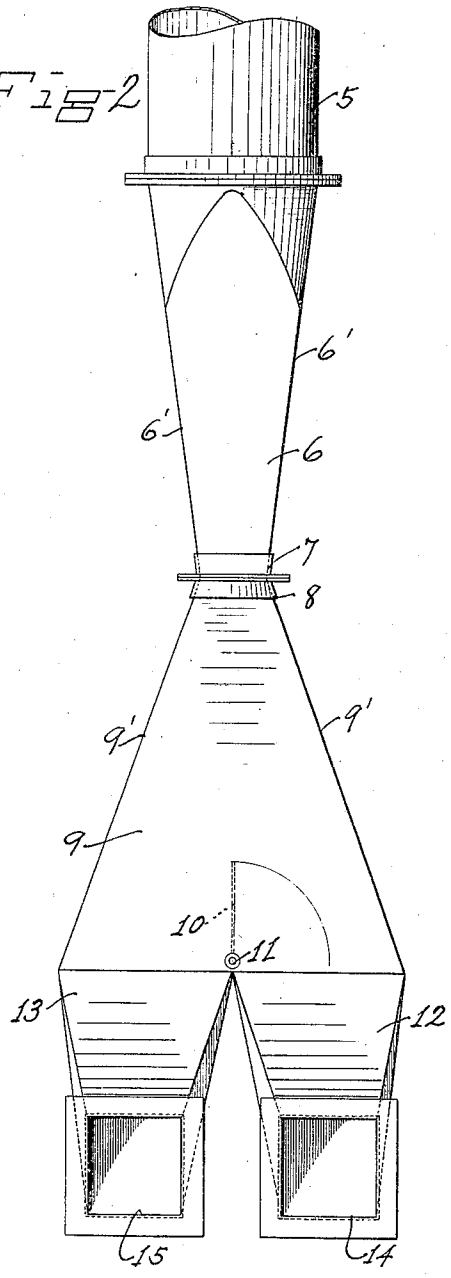


Fig-2



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UNITED STATES PATENT OFFICE

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DEVICE FOR MIXING AIR AND SOLID PARTICLES

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This invention relates to a device that constitutes a conduit or conveyer for fine particles of solid substances carried along by gaseous fluids or air in such a manner that the fluid and solid particles will be thoroughly mixed or commingled with each other, and stratification or streams in which the solids are more concentrated than in other portions will be avoided. The invention is especially useful in connection with feeding of powdered coal to fuel burners, but it is not restricted to this particular use.

The invention will be understood from the description in connection with the accompanying drawing showing an illustrative embodiment thereof, in which Fig. 1 is a side elevational view of the device, and Fig. 2 is a similar view taken at right angles to Fig. 1.

In the drawing, reference character 5 indicates a feed pipe or conduit that leads from a source of the powdered fuel (not shown). It is conveyed by means of air from the source to the fuel burners that may be located, in a well-known manner, in the walls of a furnace or furnaces. A portion or section 6 is connected to the pipe 5, and is so shaped that the cross section thereof has dimensions at right angles to each other differing in length. The distance through the upper end of the section 6 in one direction is approximately the same as the diameter of the pipe 5, and gradually decreases as shown by the converging walls 6′ in Fig. 2, while the distance through the upper end of the section 6 at right angles to the one just described is approximately the same as the diameter of the pipe 5 where the two join and increases as shown by the diverging curved walls 6″ in Fig. 1, the relation between the two distances preferably being such that the cross sectional area of the section remains substantially constant. The lower end or lower mouth of the section 6 is, therefore, narrow and elongated. It is provided with a flange portion 7 that is connected to a correspondingly shaped flange portion 8 of the lower section 9.

The section 9 is shaped somewhat like section 6. The long and short dimensions thereof begin at the top of the section 9 so that they coincide with the bottom of the section 6, but gradually change toward the lower portion of the section 9, in such a manner that the cross sectional area of the conduit remains substantially constant, and so that the long dimension at the lower end of the section 9 is at right angles to the long dimension of the lower end of the section 6, and also the short dimension of the lower end of the section 9 is at right angles to the short dimension of the lower end of the section 6. The opposite walls 9′ of the section 9 diverge from each other (Fig. 2), and the other walls 9″ converge toward each other along curved surfaces as shown in Fig. 1.

A deflecting plate or valve 10 extends across the middle of the lower end of the section 9, perpendicular to the long dimension of this section, and is mounted on a rod 11 that extends to the outside and can be turned for moving the valve from one side to the other. Two branches, 12 and 13, extend from the lower end of the section 9 on opposite sides of the valve 10, and have mouths or openings 14 and 15 to which pipes or conduits leading to the fuel burners can be attached. The valve 10 can be turned into different fixed positions and retained in those positions to vary the relative proportion of the material that is caused to enter the respective branches 12 and 13. Although only two branches and one valve are illustrated in this embodiment of the invention, it will be understood that the device may be made with additional branches and valves if desired.

The operation is as follows:

Air carrying powdered fuel in suspension passes through the pipe 5 and enters the section or portion 6. The stream coming from the pipe 5 that is circular in cross section, enters the section 6 and spreads out somewhat in fan-shape in one direction and narrows up at right angles to this direction, then passes from the lower end of the section 6 into the correspondingly shaped upper end of the section 9, whereupon it follows along the curved walls 9″, the distances between which continuously decrease, and it spreads out at right angles, following along the walls 9′, the distances between which increase, finally passing out of the lower end of the section 9,

into the branches 12 and 13. It will be obvious that, even if the stream leaves the pipe 5 with the coal concentrated along some of the layers or strata, the changes in the shape of the stream again mixes the air and powdered fuel, so that by the time they reach the outlets 12 and 13, the mixture is practically or entirely homogeneous.

Various modifications and changes may be made without departing from the spirit or scope of the invention.

I claim:

1. In a device of the character described, a conduit, a rectangular section connected to said conduit, a second rectangular section connected to said first-named section and turned at an angle thereto, each section increasing in one dimension and decreasing proportionately in another along the length of said device to maintain the cross sectioned area substantially constant at different positions along said sections.

2. In a device of the character described, a conduit, a rectangular section of substantially uniform cross sectional area having opposite sides tapering in opposite directions connected to said conduit, a second rectangular section of substantially uniform cross sectional area having opposite sides tapering in opposite directions connected to said first-named section, the connected portions of said rectangular sections having transverse dimensions greater than the corresponding transverse dimensions parallel thereto of any other portion of said sections.

3. In a device of the character described, a conduit, a section of substantially uniform cross sectional area connected to said conduit having two sides converging and two sides diverging, and a second section of substantially uniform cross sectional area connected to said first-named section having two sides converging and two sides diverging, the connected portions of said sections having a transverse dimension greater than the transverse dimensions of any other portion of said first-named section, the long dimensions at opposite ends of said second section being at an angle to each other.

4. In a device of the character described, a conduit, a section of substantially uniform cross sectional area connected to said conduit having two sides converging and two sides diverging, and a second section of substantially uniform cross sectional area connected to said first-named section having two sides converging and two sides diverging, the long dimensions at opposite ends of said second section being at an angle to each other, and a deflecting plate in said second section.

5. In a device of the character described, a conduit, a section of substantially uniform cross sectional area connected to said conduit having unequal dimensions at right angles to each other, and a second section connected to said first-named section having two sides converging and two sides diverging, the long dimensions at opposite ends of said second section being at an angle to each other, and a deflecting plate in said second section at a distance from the junction point of said sections.

6. In a conduit, two sections connected end to end, one section having its opposite walls converging and the other having its corresponding walls diverging with the cross sectional areas of said sections approximately constant from point to point along their lengths.

7. In a conduit, two sections connected end to end, one section having two opposing walls converging and two walls diverging and the other having corresponding walls diverging and converging, respectively, and a plurality of outlets from said last named section.

8. In a conduit, two sections connected end to end, one section having two opposing walls converging and two opposing walls diverging and the other having corresponding walls diverging and converging, respectively, a plurality of outlets from said last named section, and means for varying the relative amounts of material that passes out through said outlets.

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