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DUST COLLECTOR DEVICE

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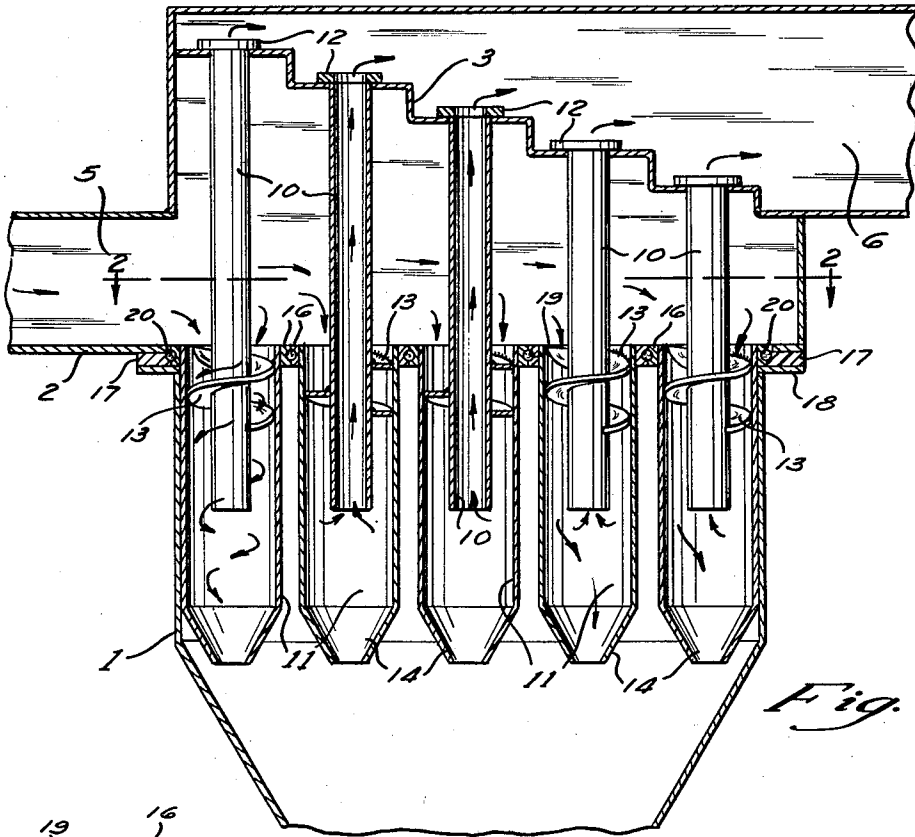


Fig. 1

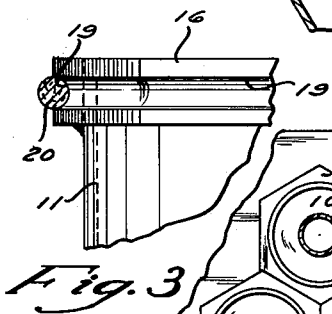


Fig. 3

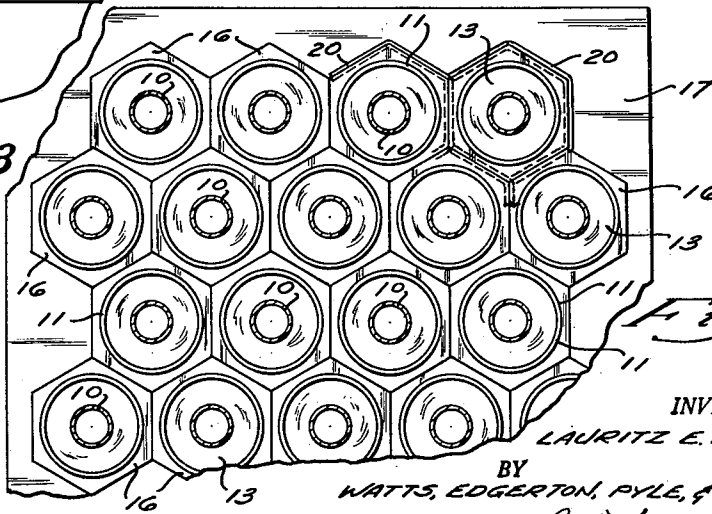


Fig. 2

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DUST COLLECTOR DEVICE

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This invention relates generally to the art of separating finely divided solids from gases and is particularly concerned with an apparatus for that purpose which is highly efficient and which is of simplified construction and reduced cost as compared with prior devices provided for the same purpose.

In prior cyclone separators having inner tubes within outer tubes, it has been customary to provide a lower deck which carried the outer tubes and which was carried by the upper end of the solids collecting hopper, a conduit to carry gases to and from said tubes, and, between the inlet and outlet of the gas carrying duct, to provide an upper deck which suspended the inner tubes with their lower end portions projecting into the outer tubes. It has been proposed to provide tubes with flanges which were to be welded together to form the lower deck.

These prior devices possessed certain disadvantages. For example, when a lower deck plate was used it was difficult and expensive to align the tube receiving openings in the upper and lower decks so closely that the inner and outer tubes would be concentric. If the flanges of the outer tubes were to be welded together, the aligning problem would be aggravated by the tendency of the welded flanges to warp, distort or shift the position of the outer tubes out of alignment with the inner tubes. Moreover, the assembly of the tubes in the two decks or replacement of any of the tubes could not be carried out effectively or efficiently in the field.

The present invention aims to overcome those disadvantages and achieves that aim by means of a new simplified and less expensive construction.

The entire steel deck which supported the outer tubes in prior devices is eliminated together with the aligning problem inherent therewith, and the new combined inner and outer tube units may be more easily installed either in the shop or in the field and individual tube units may be easily replaced without disturbing adjacent tube units. Also the new tube units can be nested more closely than in prior devices and hence more tubes and more gas cleaning capacity is provided in a given space. These advantages are novel and afford considerable economies in construction and operation.

The present invention will be better understood from the following specification and the accompanying drawings in which:

FIGURE 1 is a fragmentary, vertical sectional view of one form of apparatus embodying the present invention;

FIGURE 2 is a fragmentary plan view taken on line 2-2 of FIGURE 1; and

FIGURE 3 is a fragmentary side elevational view of one of the flanged tubes of FIGURES 1 and 2.

The drawings show a cyclone unit including a collecting hopper 1 which is rectangular in horizontal section in its upper portion and has a bottom discharge opening (not shown), a conduit 2 for conducting gases to and from the hopper and a baffle 3 which is spaced above the top of the hopper and which divides the conduit 2 into an inlet chamber 5 and an outlet chamber 6.

Means is provided in the upper part of the hopper for separating fine solids from gases flowing through conduit 2 and chamber 5. This means includes a plurality of tube units, each consisting of an inner tube 10 and

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an outer tube 11. Each inner tube extends down through the baffle 3 and at its upper end is supported thereby, as by ring 12, and at its lower end projects into the upper end of the outer tube 11 and is connected thereto.

Thus each tube unit is supported solely from baffle 3.

The inner tube is of smaller diameter than the outer tube and thus an annular space is provided between the tubes of each unit through which gases and solids may flow downwardly. Preferably, means is provided in each annular space for giving the descending gases a swirling motion to facilitate the separation of the solids from the gases. The illustrated means for producing this swirling action is the spiral vane 13 which is connected to the inner tube, spans the annular space and is connected to the outer tube. The lower ends of the outer tubes 11 are preferably frusto-conical, as indicated at 14.

Means is provided for insuring that substantially all flow of gases into or out of the hopper will take place through the tube units. This means, as illustrated, comprises flanges 16 attached to, and extending outwardly from, the upper ends of the outer tubes 11, a filler 17 closing the upper end of the hopper around the several tube units and resting on flange 18 of the hopper; and packing filling the spaced between the adjacent flanges and between the flanges of the outermost tube units and the filler. Each flange 16 is provided with an encircling groove 19 in which suitable packing 20, such as asbestos rope and the like, is disposed and a corresponding groove is provided in the filler to cooperate with the grooves in the adjacent flanges. When the tube units are assembled in filler 17, and the packing 20 fills and is compressed in the opposed grooves 19 of the flanges and filler, the flow of gases between the several flanges and between the flanges and the filler will be substantially prevented.

Preferably, the flanges 16 are hexagonal and the filler 17 is rectangular to fit the top of the hopper, as shown in FIGURE 2, but the flanges may be of any desired configuration, and the hopper may also be of any desired horizontal cross sectional shape.

Having thus described this invention in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains to make and use the same, and having set forth the best mode contemplated of carrying out this invention, I state that the subject matter which I regard as being my invention is particularly pointed out and distinctly claimed in what is claimed, it being understood that equivalents or modifications of, or substitutions for, parts of the above specifically described embodiment of the invention may be made without departing from the scope of the invention as set forth in what is claimed.

What is claimed is:

1. Apparatus for removing fine solids from gases comprising a collecting hopper, a conduit for conducting gases to and from the upper end of said hopper, a baffle spaced from the top of the hopper and dividing the conduit into inlet and outlet chambers, means including a plurality of tube units in the upper part of the hopper for separating fine solids from gases flowing through said inlet chamber, each of said units including an inner tube supported by and extending down through said baffle and into said hopper, and an outer tube secured to the lower end portion of the inner tube and defining an annular space about the inner tube, and means for insuring that substantially all the gases flowing through the conduit will pass through said units, said flow-insuring means including flanges extending outwardly from the upper end portions of the outer tubes, a gas impervious filler closing the upper end of the hopper and surrounding the

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tube units and packing between the several flanges and between the filler and the flanges adjacent thereto.

2. Apparatus for removing fine solids from gases comprising a collecting hopper, a conduit for conducting gases to and from the upper end of said hopper, a baffle spaced from the top of the hopper and dividing the conduit into inlet and outlet chambers, means including a plurality of tube units in the upper part of the hopper for separating fine solids from gases flowing through said inlet chamber, each of said units including an inner tube supported by and extending down through said baffle and into said hopper, an outer tube around the lower end portion of the inner tube and defining an annular space about the latter, and a spiral vane spanning said space and connecting the two tubes together, and means for insuring that substantially all the gases flowing in the conduit will pass through said units, said flow-insuring means including flanges extending outwardly from the upper end portions of the outer tubes, a gas impervious filler closing the upper end of the hopper and surrounding the tube units and packing between the several flanges and between the filler and the flanges adjacent thereto.

3. Apparatus for removing fine solids from gases comprising a collecting hopper, a conduit for conducting

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gases to and from the upper end of said hopper, a baffle spaced from the top of the hopper and dividing the conduit into inlet and outlet chambers, means including a plurality of tube units in the upper part of the hopper for separating fine solids from gases flowing through said conduit, each of said units including an inner tube supported by and extending down through said baffle and into the hopper and an outer tube in the hopper, secured to the lower end portion of the inner tube and defining an annular space about the latter, flanges extending outwardly from the upper ends of said outer tubes and having peripheral grooves for packing, a gas impervious filler closing the upper end of the hopper, surrounding the tube units and having a groove in its inner periphery, and packing filling said grooves and serving to prevent flow of gases between the flanges and between the flanges and filler.

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