May 4, 1937. J. H. DICKERSON 2,079,315

DUST COLLECTOR

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Fig. 1.

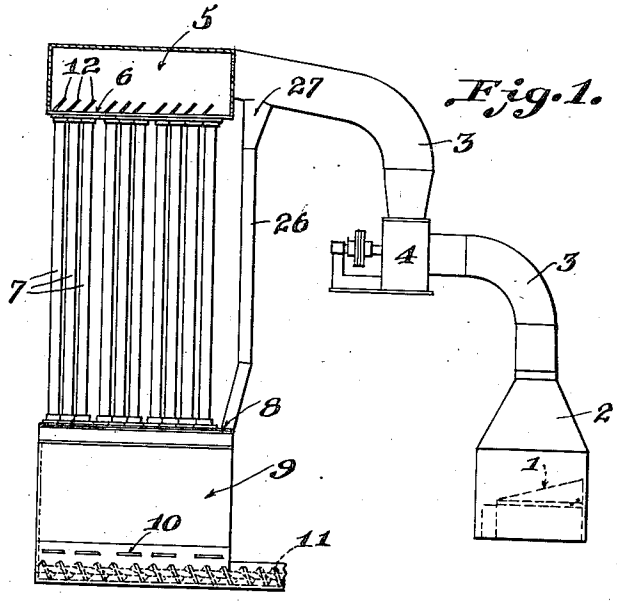


Fig. 2.

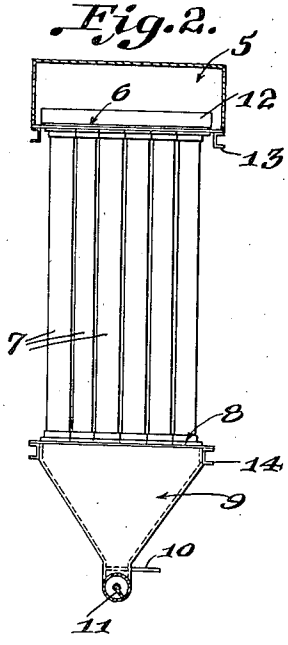


Fig. 3.

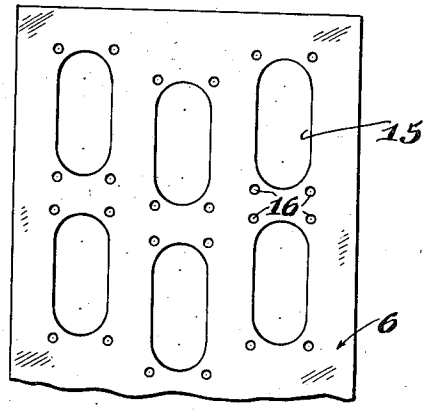
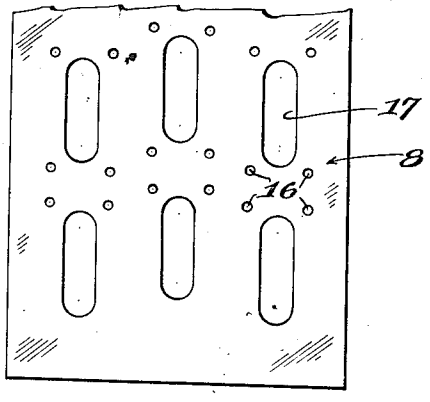


Fig. 4.



Inventor,
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DUST COLLECTOR

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Fig. 5.

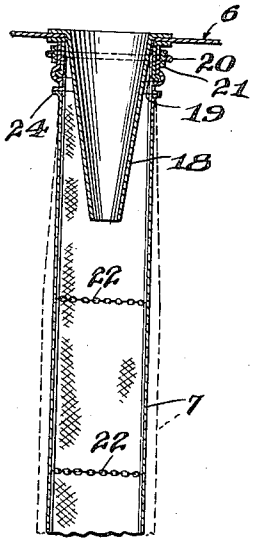


Fig. 6.

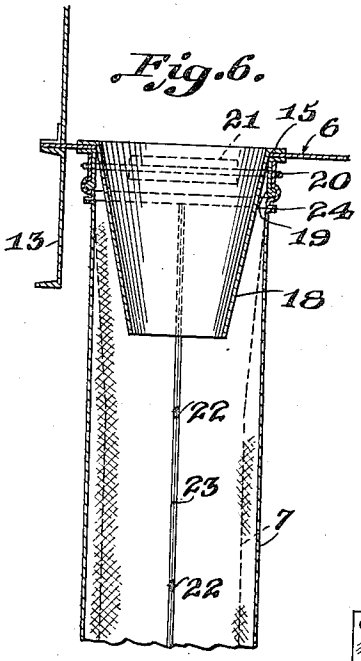


Fig. 8.

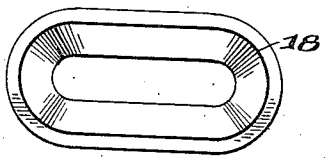


Fig. 9.

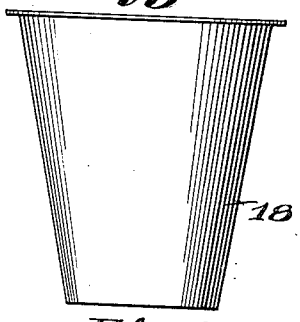


Fig. 10.

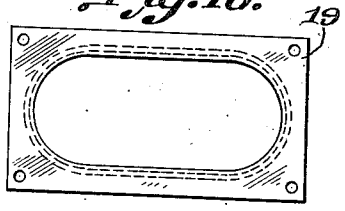


Fig. 11.

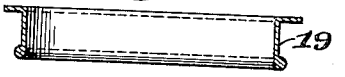


Fig. 12.

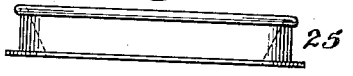
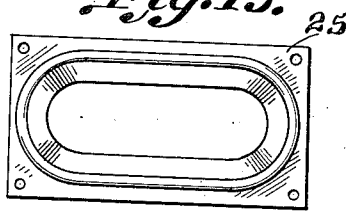
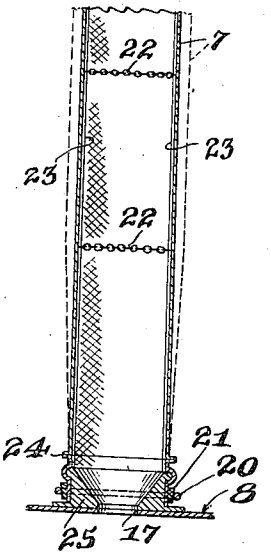


Fig. 13.





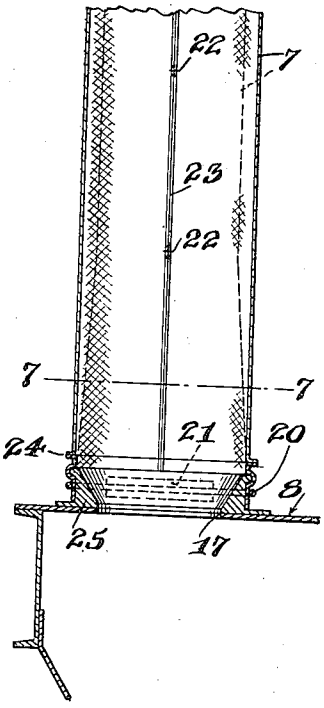
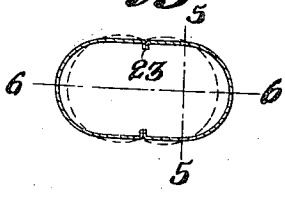


Fig. 7.



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Patented May 4, 1937 2,079,315

UNITED STATES PATENT OFFICE

2,079,315

DUST COLLECTOR

James H. Dickerson, New Philadelphia, Ohio

Application September 1, 1933, Serial No. 687,769

5 Claims. (Cl. 183—58)

This invention relates to dust collectors of the tube type, where thickly dust laden air is collected from around machinery, to keep the surrounding air clear, and the dust is removed from the air collected.

The main object of this invention is an improved form of tube reducing the tendency of dust to collect inside and stick to the cloth forming the side walls, increasing the efficiency of the filter, and reducing the number of parts.

Other objects will occur in the course of the following description.

I attain these objects by mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation partly in section showing the general arrangement of filter and method of collecting dust from a machine.

Figure 2 is an end view partly in section.

Figure 3 is a plan of an upper spigot plate.

Figure 4 is a plan of a lower spigot plate.

Figure 5 is a broken vertical section of a tube, and assembly with spigot plates, on the line 5—5, Figure 7.

Figure 6 is a broken vertical section of a tube, and assembly with spigot plates, on the line 6—6, Figure 7.

Figure 7 is a cross section of a tube at a point near the castings to which it is attached.

Figure 8 is a plan of metal sleeve thru which air enters the top of the tube, and Figure 9 is an elevation.

Figure 10 shows a plan of the upper spigot plate casting.

Figure 11 shows a section of the upper spigot plate casting.

Figure 12 shows an elevation of the lower spigot plate casting which may be made the same as the upper casting, with a sleeve used for reducing the opening in the bottom.

Figure 13 shows a plan of the lower spigot plate casting.

Similar numerals refer to similar parts throughout the several views. A coal cleaner, crusher, or other machine 1 is shown in outline covered with a hood 2, with pipe 3 to exhauster fan 4 and expansion chamber 5, which is mounted over the upper spigot plate 6. Tubes 7 are suspended between the upper and lower spigot plates 6 and 8, and a dust hopper 9, gates 10 and a screw conveyor 11 are shown below. Gates 12 are used to shut off air from entering at the top of a row of tubes. Structural members 13 are for the support of upper spigot plates, and members 14 for the lower spigot plates. Openings 15 in the upper spigot plates are for the sleeves 18 by which air enters the tubes from the expansion chamber. Openings 17 in the lower spigot plates are principally for the discharge of dust, and the holes 16 are for attaching castings to spigot plates. Castings or fittings 19 are attached below the large openings in upper spigot plates, and castings 25 above the lower spigot plates. Tubes are attached to fittings by straps or wire fasteners 20, and wedge blocks 21 are placed under the straps on the flat sides of the tube to hold it against the castings. Chains or straps 22 are placed at intervals across the tube to restrict its change in form. Seams 23 have the cloth doubled to give greater strength for attaching the chains and strengthening the tube between them. A seam 24 is indicated where the heavier cloth fitting over the castings is attached to the lighter filter cloth between the castings 19 and 25. Piping 26 is from the dust trap 27.

Method of operation

In operation an exhaust fan collects the dust laden air from around a machine thru the hood and piping, and delivers it to the expansion chamber. At the dust trap and in the expansion chamber the velocity is quickly reduced and the coarser dust is precipitated. From the expansion chamber the dust laden air passes down thru the upper spigot plates and the metal sleeves. The air is filtered out thru the tube fabric and the dust drops down thru the tube and lower spigot plate to the dust hopper, from which it may be removed by a screw conveyor or other means.

Instead of the tapered metal sleeve 18 being reduced to about one half the area of the tube 7, merely to protect the tube fabric, it is reduced to about one sixth, which is sufficiently large to deliver the required air to each tube without increasing the usual pressure, the air which passes thru the tube being the limiting factor. As the air expands when leaving the sleeve the velocity drops to about one sixth, so considerable dust and moisture will be precipitated down the center of the tube, and the current will be carried further down the center line. This spreads the air better and leaves less dust to be filtered from the air in passing thru the tube fabric. The tube has a larger area in proportion to its perimeter than the usual round tube, which is an advantage because the velocity is lower and more dust is dropped before the air touches the fabric.

If the dust laden air is somewhat damp, or the tubes are moist, the dust tends to stick to the filter fabric, and then to the dust itself. With the

round tube the dust may increase in thickness until the air can not pass thru the fabric, and then it builds up until the tube may be almost filled with dust. As it becomes thicker and the resistance of the air increases the layer of dust is compressed into a circular ring and becomes arched. With the improved type the fabric will tend to hang vertically between the castings with an oblong cross section, the same as the castings to which it is attached, while the fan is not in motion and there is no pressure. The weight of the chains will draw the flat sides in somewhat. When the fan is started and the tubes come under pressure the form of the tube will change to two partial circles, as the chains keep the tube from forming a single circle. The chains will be slack when not under tension, and when pressure is applied they will be drawn tight and tend to shake the tubes. In changing the cross section of the tubes tangents become arcs and arcs take longer radii, while the up and down lines of the tubes near the top and bottom change from the vertical in two directions in varying amounts, as indicated by dotted lines in Figures 5 to 7, inclusive. The shaking and changing in form are not sufficient to injure the cloth, and will make it impossible for the dust to collect and build up on the inside of the tube fabric, so their efficiency is greatly increased.

The area of the tubes is sufficient to carry a much larger quantity of air than will pass out through the cloth forming the tubes. The result is that some excess air usually passes through the tubes and makes some pressure in the dust hopper 9 below. This is objectionable and some extra tubes are provided, so that part of the tubes may be used to draw air from the dust hopper. This will permit the air to come up from below and flow upwards instead of downward as in the other tubes. They are all arranged for this reverse of air, and a row of tubes may be changed in form momentarily, and shaken in this way without affecting the others. The size of the dust collected will depend on the machine making the dust, its composition, shape of hood, the pressure of the air and its velocity to the expansion chamber, but in general it will not be necessary or advisable to handle dust particles larger than $\frac{1}{32}$'' with a tube filter. If it is desirable to draw larger particles from around a machine or chute, means may be provided to precipitate the larger material before the air enters the tubes, to give them a longer life.

Having described my invention and set forth its merits what I claim and desire to secure by Letters Patent is:

1. In a pneumatic dust collection system, the combination of a series of filter tubes, and means functioning when there is a change in operating conditions to deform the perimetric contour of said tubes without moving the vertical center and deforming the tubes in a lengthwise direction to thereby break up any dust layers present in said tubes, said means comprising chains attached to the side walls of the tubes and extending transversely of the tubes at spaced intervals throughout the length of the tubes, said chains being of sufficient weight to draw in the sides of the tubes somewhat from their original elongated cross sectional shape when no difference of pressure exists between the interior and exterior thereof but limiting the divergence of the connected joints upon an increase in internal pressure, whereby the tube walls shake when pressure changes alter their shape to dislodge accumulated solids therefrom.

2. A dust collecting system comprising in combination, a casing forming an upper expansion chamber for dust laden air, an upper tube floor at bottom of said expansion chamber, a lower dust collecting chamber, a lower tube floor at top of said dust collecting chamber, tubes suspended between said tube floors, and means functioning when there is a change in operating conditions to deform the perimeter of said tubes without deforming the tubes in a lengthwise direction to thereby break up any dust layers present in said tubes, said means including tension members attached to the elongated side walls of the tubes at intervals along the height thereof, said tension members being of sufficient weight to draw in the sides of the tube somewhat from their original elongated cross sectional shape when no difference of pressure exists between the interior and exterior thereof but limiting the divergence of the connected joints upon an increase in internal pressure, whereby the tube walls shake when pressure changes alter their shape to dislodge accumulated solids therefrom.

3. In a gas filter, a substantially vertical open ended filter tube initially elongated in cross section, a series of flexible tension members extending between and attached to the elongated side walls of said tube at intervals along the height thereof, said tension members being of sufficient weight to draw in the sides of the tube somewhat from its original elongated cross sectional shape when no difference of pressure exists between the interior and exterior thereof but limiting the divergence of the connected joints upon an increase in internal pressure, whereby the tube walls shake when pressure changes alter their shape to dislodge accumulated solids therefrom.

4. In a gas filter, a substantially vertical open ended filter tube initially elongated in cross section, a series of chain tension members extending between and attached to the elongated side wall of said tube at intervals along the height thereof, said chain members being of sufficient weight to draw in the sides of the tube somewhat from their original elongated cross sectional shape when no difference of pressure exists between the interior and exterior thereof but limiting the divergence of the connected joints upon an increase in internal pressure, whereby the tube walls shake when pressure changes alter their shape to dislodge accumulated solids therefrom.

5. In a gas filter, a substantially vertical open ended filter tube initially elongated in cross section, a series of flexible tension members extending between and attached to the elongated side walls of said tube at intervals along the height thereof, said tension members being of sufficient weight to draw in the sides of the tube somewhat from its original elongated cross sectional shape when no difference of pressure exists between the interior and exterior thereof but limiting the divergence of the connected joints upon an increase in internal pressure so that the tube walls upon the application of pressure take the form of two intersecting circles open to each other to thereby break up dust arches by change of form of the tube walls.

JAMES H. DICKERSON.