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 DEVICES FOR REMOVING FROM GAS OR VAPOR SOLID
 OR LIQUID PARTICLES SUSPENDED THEREIN
 Filed Sept. 13, 1954

2,874,800

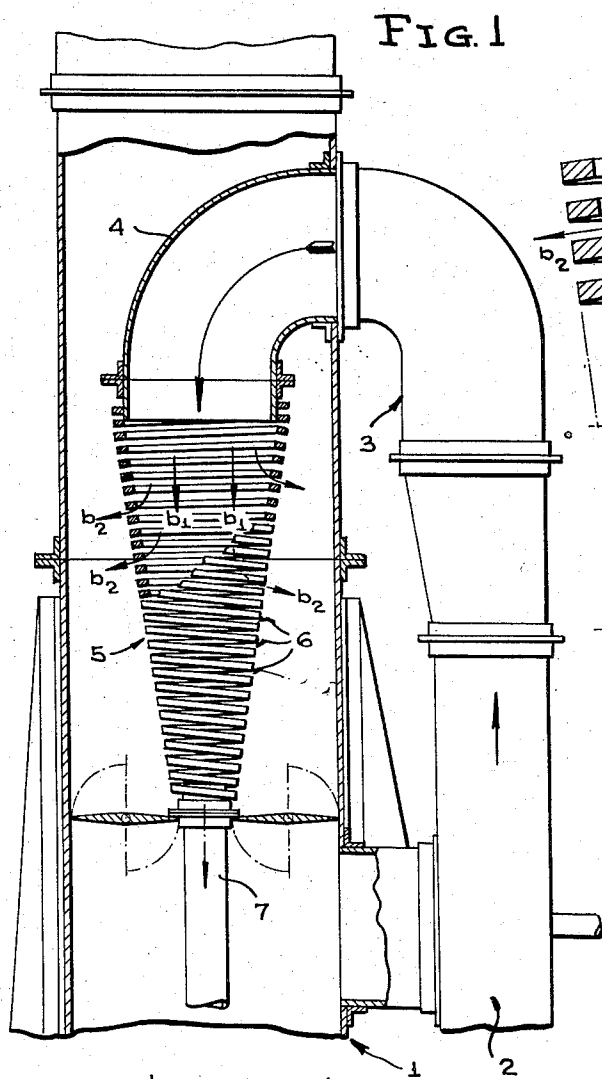
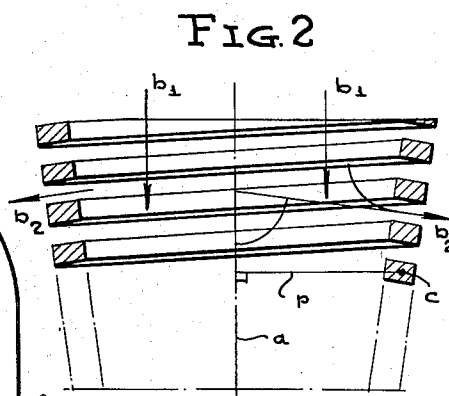
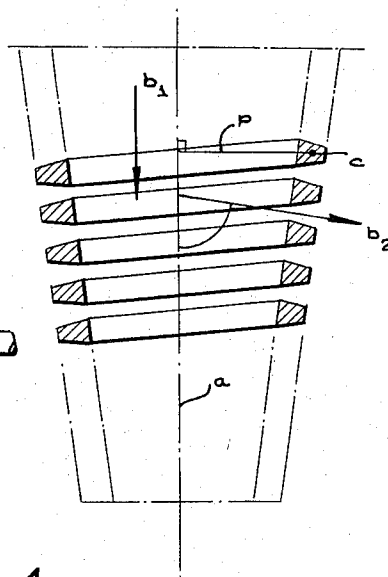
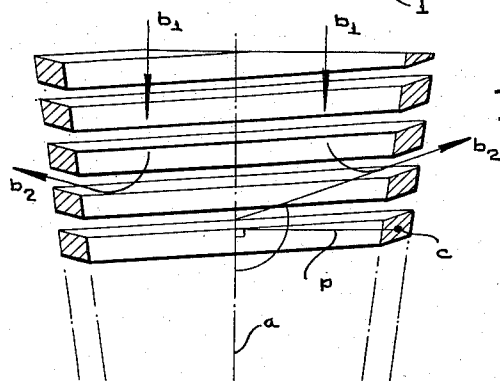


FIG. 3



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DEVICES FOR REMOVING FROM GAS OR VAPOR SOLID OR LIQUID PARTICLES SUSPENDED THEREIN

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1 Claim. (Cl. 183—44)

The present invention relates to a new and novel device for removing solid or liquid particles from a gas or vapor in which they are suspended whereby the gas or vapor is separated into a major portion, entirely or substantially partly freed from such particles, and into a minor portion wherein the specific amount of such particles is proportionally increased.

Such a device essentially comprises an elongated frusto-conical element that is composed of a wire of substantially uniform cross-section which is spirally wound into the shape of a truncated cone forming a passage for the particle laden gas or vapor and whose windings are relatively spaced so as to form a helicoidal gap through which the cleaned gas or vapor can escape.

A device of this general nature is disclosed in Haber Patent No. 2,034,467. Such patent discloses an apparatus for removing solid or liquid particles from gases or vapors, the essential element of which is constituted by a frusto-conically coiled strip having an elongated rectangular cross section, said element having its wide end connected to a conduit supplying under pressure the gas or vapor laden with solid or liquid particles, the narrow end thereof being connected to the suction side of a blower. In passing through said element, the gas or vapor will, for by far the greater part, escape through the gap between the windings of the coil because the pressure inside the element is greater than the pressure outside so that there is a flow of gas through the gaps, but the greater part of the solid or liquid particles is unable, owing to its inertia, to follow the acute bend to be followed by the gas or vapor on its way from the interior of the coil to the space outside the coil, so that said particles are discharged, together with a minor portion of the gas or vapor, through the narrow end of the coil and disposed of. Thus, said element divides the dust or liquid laden gas or vapor into two part flows, namely, a large flow which is completely or partly freed from the foreign bodies and a small flow or shunt flow in which the contents of foreign bodies is enriched by a corresponding amount.

In the manufacture of such element, described above, the strip must be stretched along one of its edges, i. e. the developed length of said edge must be increased. If it is desired to ensure both a uniform width of the gap between the consecutive windings throughout the full length of the strip and a uniform angle between the strip and the axis of the cone, which uniform width and angle are fundamental requirements for an efficient separation of the dust from the gas, such stretching operation is exceedingly difficult. Indeed, in that case, the ratio between the developed length of the stretched outer edge and the developed length of the unstretched inner edge of the winding at the narrow end of the element must considerably exceed the corresponding ratio of the winding at the wide end thereof. From the narrow to the wide end, said ratio must gradually decrease.

The invention has for its object to provide an efficient element of the general type referred to that can be manu-

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factured in a very simple and cheap manner. In accordance with the invention, the wall of the element is formed by a wire spirally wound into a truncated cone and having a cross section such that the perpendicular dropped from its center of gravity on the axis of the inscribed conical boundary surface, intersects the area wherein the section touches said inscribed or defined conical boundary surface. The wire is angular in cross section and touches the inscribed defined conical boundary surface along a straight line coinciding with a generatrix of the cone formed by the element.

Experiments have shown that, if the wire is relatively thin, i. e. if it has a thickness of say 20 mm. or less, and if the gap between the windings is sufficiently narrow, the shape of the cross section of the wire, provided that it meets the requirements stated hereinbefore, may, for instance, be that of a square, of a triangle, of a rectangle, a trapeze or a diamond, especially so since under said conditions, the angle, through which the flow of the gas or the vapor must deviate from the originally axial direction in order to escape from the passage of the element through the gaps thereof, is of minor importance. It is then not necessary for said angle to have a value of far more than 90°.

The foregoing and ancillary objects are attained by this invention, certain forms of which are shown in the attached drawing, wherein:

Figure 1 is a diagrammatic view of the environment for the new element, which is shown partly in elevation and partly in vertical section.

Figure 2 is an axial sectional view on an enlarged scale of the element of Figure 1, and,

Figures 3 and 4 are views similar to Figure 2 and showing modifications in the cross-sectional shape of the wire defining the element.

Referring more particularly to the drawing and, initially to Figure 1, the reference numeral 1 generally designates a stack or similar conveying tube for gas or vapor laden with solid or liquid particles. The gas or vapor, having solid or liquid particles suspended therein, is drawn from the member 1 by a fan 2 or similar device and forced through the conveying conduit 3, exterior of the member 1 into a delivery conduit 4. The delivery conduit 4 is disposed internally of the member 1 and conveys the gas or vapor, having solid or liquid particles suspended therein, under pressure to the wide end of the coil element 5 which is attached to the lower discharge end thereof.

The coil element 5 is axially arranged in the member 1. The truncated conical element 5 is made by winding a wire having an angular cross section on a truly conical form. The windings are spaced to provide gaps 6 through which the major part of the cleaned gas or vapor will escape, whereas the solid or liquid particles will, owing to their inertia, be carried to and discharged through the narrow open end of the coil, together with a minor part of the gas or vapor, into a conduit 7 which discharges the particles into a suitable chamber (not shown). In passing through said element 5, the major portion of the gas or vapor will escape through the spiral gaps 6 between the windings of the element because the pressure inside the element is greater than the pressure outside, but the greater part of the solid or liquid particles is unable, owing to its inertia and the pressure, to escape through the gaps, so that the particles are discharged, together with a minor portion of the gas or vapor, through the discharge conduit 7.

As shown in Figures 1 and 2, the major portion of the gas or vapor will flow through the gaps in the directions of the arrows b_2 , while the particles and minor portion of the gas or vapor will follow the direction of the arrows b_1 .

In Figure 2, the axis of the truncated cone is indicated

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by a . The wire has a rectangular cross section and the perpendicular p dropped from the center of gravity c of said cross section on the axis a intersects the straight inner side of the section. The angle, through which the cleaned vapor or gas has to deviate from its originally axial direction of flow, is indicated by the angle designation between the axis a and the arrow b_2 .

The inner surface of each wire defines a conical boundary surface and it is to be noted that the wire is angular in cross section and touches the inscribed conical boundary surface along a straight line coinciding with a generatrix of the cone formed by the frusto-conical element.

Thus, the element 5 is an elongated frusto-conical element, which is open at both its ends, and said element is made up of the spirally wound wire the windings of which are spaced to form the helicoidal gaps 6 through which the cleaned gas or vapor can escape.

In Figure 2, the cross section of the wire is trapeziform, whereas in Figure 4, the cross section of the wire is diamond shaped. Both Figures 3 and 4 show a perpendicular p dropped from the center of gravity c of the cross section of wire on the axis a of the inscribed conical surface or the defined conical boundary surface.

The wire may be formed of any angular cross-sectional shape, with the full area of the inner face of the wire touching the conical boundary surface inscribed or defined by the coil.

Accordingly, while various forms have been shown and described, limitation is sought only in accordance with the appended claim.

What I claim is:

A device for removing solid or liquid particles from

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gas or vapor so as to separate the gas or the vapor into a major portion wholly or partly freed from these particles, and a minor portion wherein the specific amount of said particles is proportionally increased; said device comprising an elongated frusto-conical element open at both of its ends, said element being composed of a wire of substantially uniform cross-section, spirally wound into the shape of a truncated cone, the windings being relatively spaced apart to form helicoidal gaps through which the cleaned gas or vapor can escape, said wire in its truncated conical shape defining a frusto-conical passage and having a cross section such that the perpendicular dropped from the center of gravity of the cross section on the axis of the defined conical boundary of the passage intersects the area wherein said section touches the defined conical boundary surface, said wire being angular in cross section and touching the inscribed conical boundary surface along a straight line coinciding with a generatrix of the cone formed by the frusto-conical element.

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