No. 897,342. PATENTED SEPT. 1, 1908.

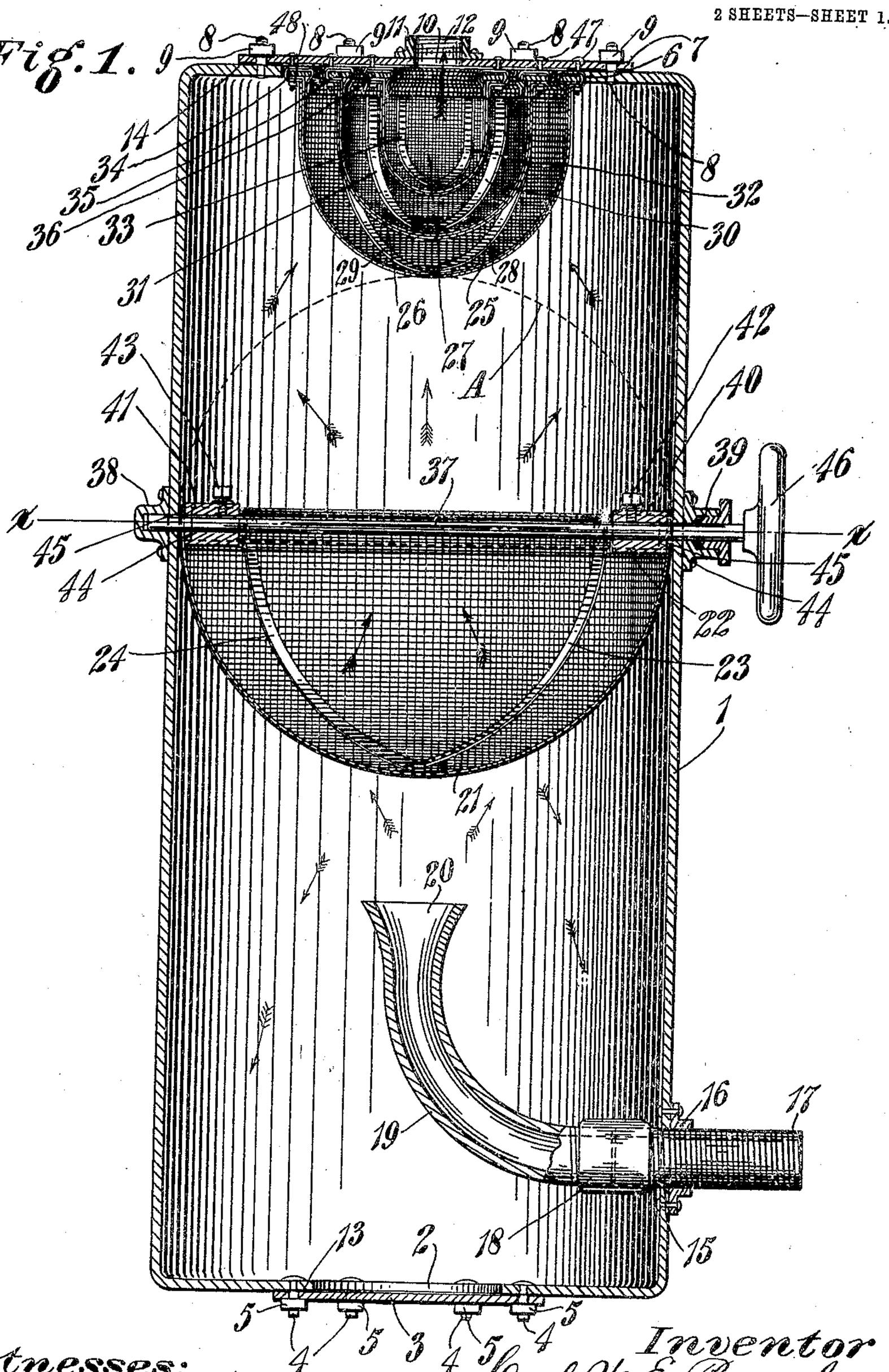
C. W. E. BOEGEL.

DUST SEPARATING APPARATUS.

APPLICATION FILED MAR. 30, 1908.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

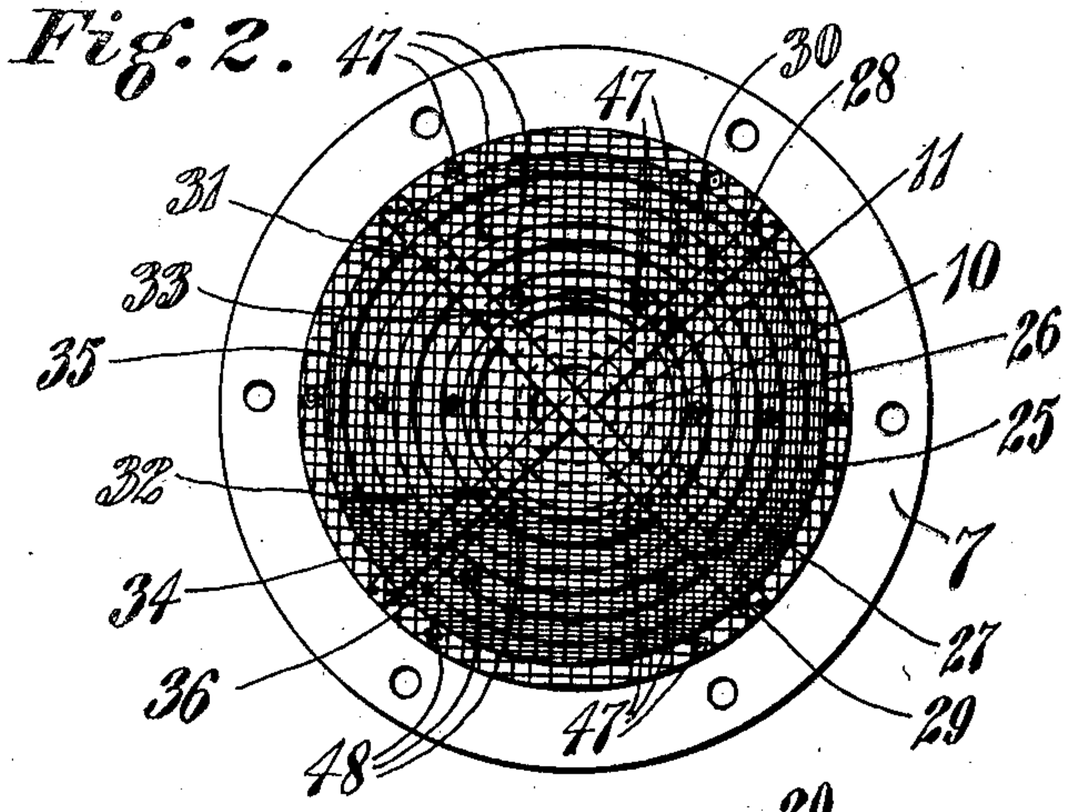


Fig. 3.

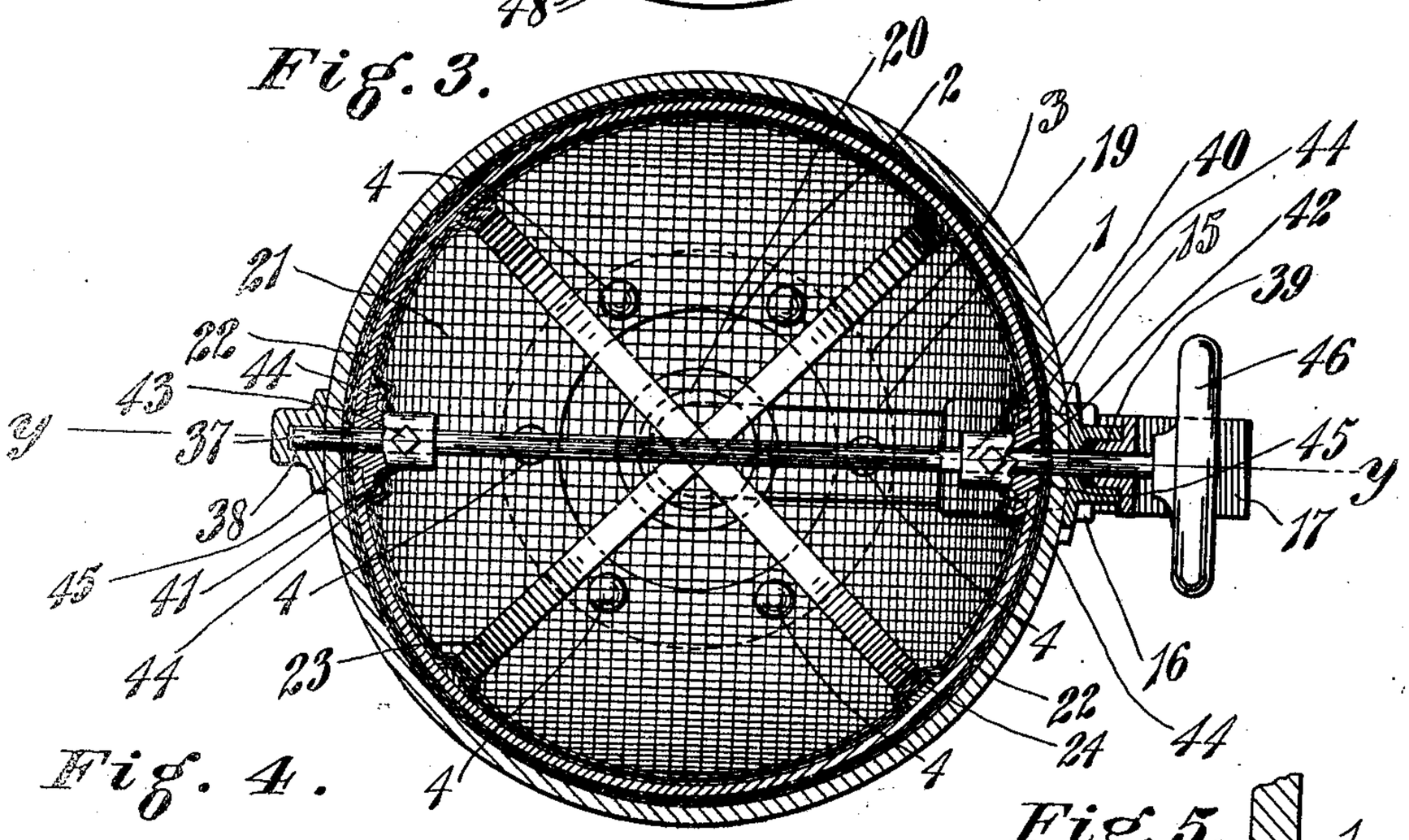
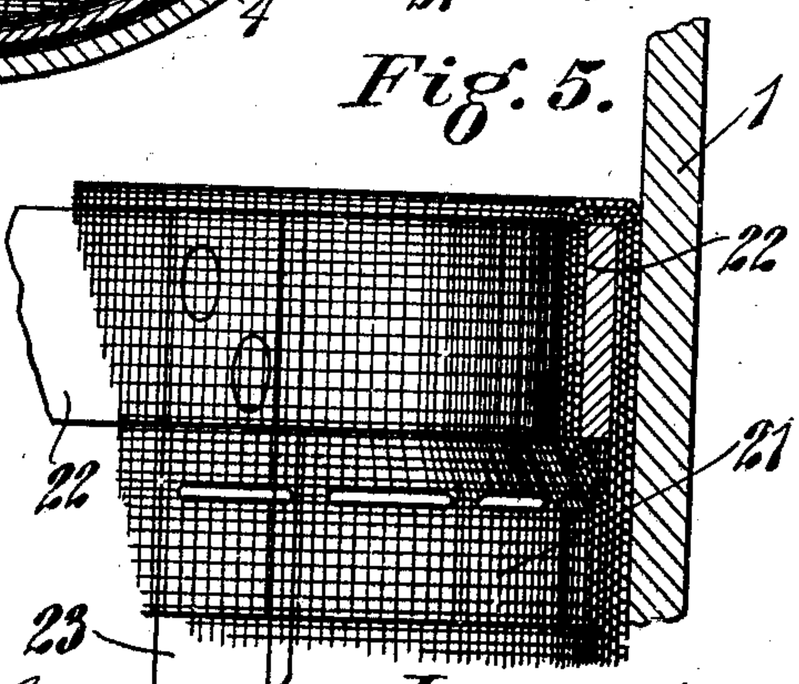


Fig. 4.

Fig. 5.



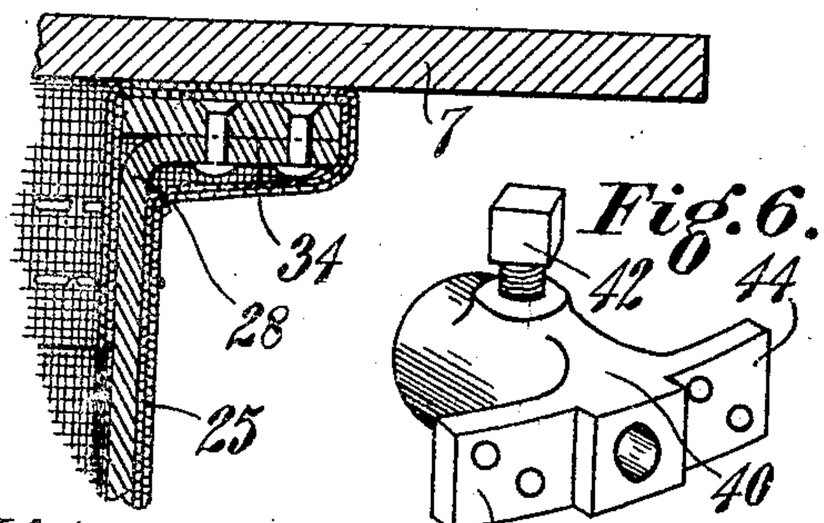


Fig. 6.

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UNITED STATES PATENT OFFICE.

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DUST-SEPARATING APPARATUS.

No. 897,342. Specification of Letters Patent. Patented Sept. 1, 1908.

Application filed March 30, 1908. Serial No. 423,994.

To all whom it may concern:

Be it known that I, CARL W. E. BOEGEL, a citizen of the United States, residing at Lima, in the county of Allen and State of Ohio, have invented certain new and useful Improvements in Dust-Separating Apparatus, of which the following is a specification.

My invention relates to improvements in apparatus for separating dust from air, being more especially designed for use in connection with a vacuum inducing apparatus for removing dust from carpets and other objects of like character, although it will prove equally efficient when used in connection with a blowing apparatus, to prevent the passage of the dust into the open air.

My invention consists in a casing provided internally with a primary foraminous diaphragm, an inlet below and an outlet above the primary diaphragm, and a series of secondary foraminous diaphragms interposed between the primary diaphragm and the outlet, as well as in the details of construction and arrangement of parts as will hereinafter be more fully described and claimed.

In the drawings: Figure 1 is a vertical section, on a line corresponding to the line *y*—*y* of Fig. 3, of an apparatus embodying my invention. Fig. 2 is a bottom view of the top lid, having the series of secondary diaphragms in place thereon. Fig. 3 is a cross section on a line corresponding to the line *x*—*x* of Fig. 1. Fig. 4 is an enlarged sectional view, illustrating the attachment of one of the series of secondary diaphragms to the top lid, and Fig. 5 is a similar view, illustrating the attachment of the primary diaphragm to the hoop. Fig. 6 is a detailed perspective view of one of the hubs.

The casing 1, of cylindrical formation is provided at its lower end with an opening 2 closed by a bottom lid 3, which is held in place by means of stud bolts 4 permanently secured in the adjacent wall of the casing and nuts 5 on the bolts 4. The upper end of the casing 1 is provided with an opening 6 preferably of greater diameter than that of the opening 2 in the lower end, and this opening 6 is closed by a top lid 7 held in place by stud bolts 8 and nuts 9 thereon, the bolts being permanently secured in the adjacent wall of the casing 1 in the same manner as are the bolts 4. The top lid 7 is provided with a centrally located opening 10, concentric with which is a flange 11 riveted to the lid 7 and having screw threads 12 by means of which a pipe or hose may be connected to communicate between the interior of the casing 1 and a suitable vacuum inducing apparatus, not herein shown since it does not constitute part of my invention. Both the plates 3 and 7 are provided with suitable gaskets at 13 and 14, respectively, so that air-tight joints are formed between them and the adjacent wall of the casing.

Near the lower end of the casing an opening 15 is provided in one of its sides, concentric with which a flange 16 is riveted to the wall of the casing, and through which flange a nipple 17 is screwed to project inside of the casing, where a coupling 18 is screwed onto the nipple. A bent spout 19 is screwed into the coupling and preferably has a flaring upper end 20. The use of the nipple 17 and coupling 18 in connection with the flange 16 is for the purpose of facilitating the mounting of the curved spout 19 inside the casing, since it is impossible to turn the spout 19 completely around in the casing. By using the nipple 17 and coupling 18, the coupling 18 may be screwed onto the spout 19 and introduced into the casing, whereupon the nipple 17 may be screwed through the flange 16 into the coupling, drawing the parts firmly into position and holding them. To the outer end of the nipple 17 a pipe or hose may be connected so as to communicate through the spout 19 between the interior of the casing, and a suitable nozzle or renovating tool in an air-tight manner, and which nozzle or renovating tool, not constitutin part of this invention, need not be herein described.

Near the middle of the height of the casing 1, the concavo-convex primary foraminous diaphragm 21 is mounted with its convex side normally downward toward the flaring opening 20 of the spout 19. The spout 19 and the primary diaphragm 21 are so located with respect to each other that the lowermost surface of the diaphragm 21 will be at a sufficient distance from the flaring opening 20 of the spout 19 to prevent the lodgment of dust particles between the spout and the diaphragm when these particles are thrown back by contact with the lower surface of the diaphragm, on coming out of the spout 19, as indicated by arrows in Fig. 1. By having the diaphragm spaced away from the spout 19, the dust particles will be directed laterally of the casing and fall to its bottom around the spout, where they may be taken

out through the opening 2 by removing the lid 3 from the lower end of the casing. The diaphragm 21 is preferably composed of three thicknesses of burlap of suitable mesh at its edges around a hoop 22, and reinforced by semi-circular ribs 23 and 24 riveted at their ends to the hoop 22. The manner of sewing the burlap around the hoop 22 as well as of securing the ends of the braces to the hoop is clearly illustrated in Fig. 5 of the drawing.

The foraminous diaphragm intercepts the coarser dust particles, carried by the air through the spout 19 from the nozzle or renovating tool, but in order to further purify the air after it passes through the primary diaphragm, a secondary series of diaphragms is interposed between the primary diaphragm 21 and the outlet through the opening 10 in the lid 7. The first diaphragm of this secondary series is preferably composed of two thicknesses of burlap of a somewhat finer mesh than that of the burlap composing the primary diaphragm 21, while the second diaphragm 26 of the secondary series is of finer mesh than that of the first diaphragm 25, and the third and last diaphragm 27 is of finer mesh than that of the second diaphragm 26. Each of the diaphragms 26 and 27 is also composed of two thicknesses of burlap and all of the diaphragms 25, 26 and 27 of the secondary series are reinforced by ribs 28 and 29, 30 and 31 and 32 and 33, respectively, which ribs are riveted to flat hoops 34, 35 and 36, respectively, around which are sewed the edges of the burlap composing the diaphragms 25, 26 and 27, respectively. The manner in which the ribs are secured to the flat hoop, as well as the manner of sewing the burlap around the ribs and hoops is clearly illustrated in Fig. 4 of the drawing.

During the use of the apparatus the meshes of the primary diaphragm 21 will become clogged with dust particles, and in order to provide for cleaning the diaphragm 21, I make it invertible by mounting it rigidly on a shaft 37, journaled in a closed cap 38 riveted on the outside of the casing in an air-tight manner at one end, and journaled in a stuffing-box 39 on the wall of the casing at the other end. Inside the casing, hubs 40 and 41 are rigidly mounted on the shaft 37 by means of set screws 42 and 43, respectively, and these hubs have arms 44 projecting laterally therefrom, to which are riveted the ends of the hoop 22 which is made in two semi-circular sections for this purpose. The hubs 40 and 41 are so proportioned that the outer sides of the hoop 22 conform to their outer ends 45 and present along with them a regular convex surface toward the concave surface of the interior of the casing 1, between which are inserted the thicknesses of burlap composing the diaphragm 21, to form a packing, as is best illustrated in Fig. 3 of the drawing. A hand wheel 46 is rigidly mounted on the end of the shaft 37 outside the casing, and when it is desired to clean the diaphragm 21, the shaft 37 may be rotated by means of the hand wheel 46, to invert the diaphragm 21, which inverted position is indicated by the dotted line A in Fig. 1. The primary diaphragm 21 is so located with reference to the secondary diaphragms that the primary diaphragm will engage slightly with the lowermost surface of the first diaphragm 25 of the secondary series, thus causing a jarring of the primary diaphragm as well as of the secondary diaphragm, efficiently dislodging the dust particles from the recesses of both diaphragms.

By constructing the primary diaphragm in a substantially hemispherical shape and positioning the ribs 23 and 24 at acute angles to the axis of rotation of the diaphragm, two distinct contacts between the primary diaphragm 21 and the first secondary diaphragm 25 will occur during the act of inverting the primary diaphragm. The first contact of the primary diaphragm 21 with the secondary diaphragm 25 will be in the region of the hoop 22, while the second contact will be at the point where the ribs 23 and 24 cross, and which is the lowermost point of the primary diaphragm when it is in normal operative position. There will be no contact between the diaphragms excepting at the points above mentioned, owing to the fact that between the ribs the burlap forming the diaphragm will not be distended to the full hemispherical shape, but will stretch in substantially a straight line from one rib to the next one.

It is desirable that the primary diaphragm should be constructed with the circular hoop 22 and the semi-circular ribs 23 and 24 to form a substantially hemispherical structure, since this allows the greatest extent of burlap, or other air filtering material, to be presented downward, and at the same time allow all of the parts of the diaphragm to pass the interior surface of the wall of the casing when the diaphragm is inverted.

In order that the diaphragm of the secondary series may be more thoroughly cleaned, the flat hoops 34, 35 and 36 upon which they are mounted are attached to the lower side of the top lid 7 by means of stud bolts 47 permanently secured in the lid 7, and nuts 48 on the ends of the stud bolts below the flat hoops. Then when it is desired to clean the diaphragms, the top lid may be removed by unscrewing the nuts 9 from the stud bolts 8, and withdrawing it, together with the diaphragms of the secondary series, from the casing, whereupon access is given to the primary diaphragm 21. The diaphragms of the secondary series may then be conveniently

removed by unscrewing the nuts 48, and as conveniently replaced after cleaning. This thorough cleaning of the diaphragms will not be often required, owing to the fact that the primary diaphragm 21 and the first diaphragm 25 of the secondary series, which will receive most of the accumulation, may be readily cleaned by means of inverting the primary diaphragm 21 and bringing them into contact as above described. This inversion of the primary diaphragm 21 also allows the dust particles, thrown back from the diaphragm 25, to fall to the bottom of the casing, where they may be removed through the opening 2 therein.

Having fully described my invention, I claim:

1. In dust separating apparatus, a cylindrical casing, an inverted concavo-convex primary foraminous diaphragm in the casing, the casing having an inlet below the diaphragm and an outlet above the diaphragm, a spout communicating with the inlet and adapted to direct air and dust against the convex side of the diaphragm, and a series of secondary foraminous diaphragms, interposed between the primary diaphragm and the outlet, substantially as and for the purposes specified.

2. In dust separating apparatus, a casing of cylindrical formation having an inlet in its convex side near its lower end, a foraminous diaphragm in the casing of hemispherical formation, presenting its convex side downward toward the lower end of the cylindrical casing and adapted to be rotated therein to invert it, a curved spout communicating with the inlet and adapted to conduct air and dust upward against the convex side of the diaphragm whereby the air may pass through the diaphragm and whereby dust will be intercepted by the diaphragm and thrown downward in the casing around the curved spout, and an outlet from the casing above the diaphragm, substantially as and for the purposes specified.

3. In dust separating apparatus, a cylindrical casing, an inverted concavo-convex primary foraminous diaphragm in the casing, the casing having an inlet below the diaphragm and an outlet above the diaphragm, a curved spout communicating with the inlet and adapted to direct air and dust against the convex side of the diaphragm, and a series of secondary foraminous diaphragms interposed between the primary diaphragm and the outlet, substantially as and for the purposes specified.

4. In dust separating apparatus, an upright cylindrical casing having an opening in its lower end for the removal of dust, and an opening for the admission of air and dust an invertible concavo-convex primary foraminous diaphragm in the casing, a curved spout communicating with the opening for the admission of air and dust and adapted to conduct the air and dust upward against the convex side of the primary diaphragm, a lid adapted to close the opening in the lower end of the casing against the admission of air, the casing having an opening in its upper end, a top lid adapted to close the opening in the upper end against the admission of air, a series of hoops on the lower surface of the top lid, and a series of secondary foraminous diaphragms mounted on the hoops, the top lid having an opening for the outlet of air, and the secondary diaphragms being interposed between the primary diaphragm and the opening for the outlet of air, substantially as and for the purposes specified.

5. In dust separating apparatus, a casing, a primary foraminous diaphragm in the casing, the casing having an inlet below and an outlet above the primary diaphragm, and a series of secondary diaphragms interposed between the primary diaphragm and the outlet, the primary diaphragm being invertible and adapted to engage with one of the secondary diaphragms when being inverted, substantially as and for the purposes specified.

6. In dust separating apparatus, a casing having an inlet for air and dust and an opening for the removal of dust, a bottom lid for closing the opening against the admission of air, a concavo-convex primary foraminous diaphragm in the casing above the inlet and the opening for the removal of dust, a curved spout communicating with the inlet and adapted to conduct the air and dust against the convex side of the primary diaphragm, the casing having an opening above the primary diaphragm, a top lid for closing the opening above the primary diaphragm against the admission of air and having an outlet for the passage of air from the casing, a series of rings on the lower surface of the top lid, and a series of secondary foraminous diaphragms mounted on the hoops, the primary diaphragms being invertible to engage with one of the secondary diaphragms, and the hoops being removable from the top lid, substantially as and for the purposes specified.

7. In dust separating apparatus, a casing having an inlet and an outlet, a diaphragm in the casing, a shaft extending through the casing, a stuffing box for the shaft where it extends through the casing, forming a journal bearing therefor, hubs rigidly mounted on the shaft, arms on the hubs, semi-circular hoops secured to the arms on the hubs, and semi-circular ribs secured to the hoops, whereby the primary diaphragm is invertible and of substantially hemispherical formation and supported between the inlet and the outlet, substantially as and for the purposes specified.

8. In dust separating apparatus, a cylindrical casing having an inlet for air and dust in its convex side near its lower end, and an

outlet for air in its upper part, a diaphragm in the casing interposed between the inlet and the outlet, a flange on the convex side of the casing concentric with the inlet and having interior threads, a nipple having exterior threads, and extending through the flange from the exterior to the interior of the casing, a coupling on the nipple inside the casing, and a curved spout screwed into the coupling, adapted to direct air and dust from the inlet toward the diaphragm, substantially as and for the purposes specified.

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