

April 4, 1939.

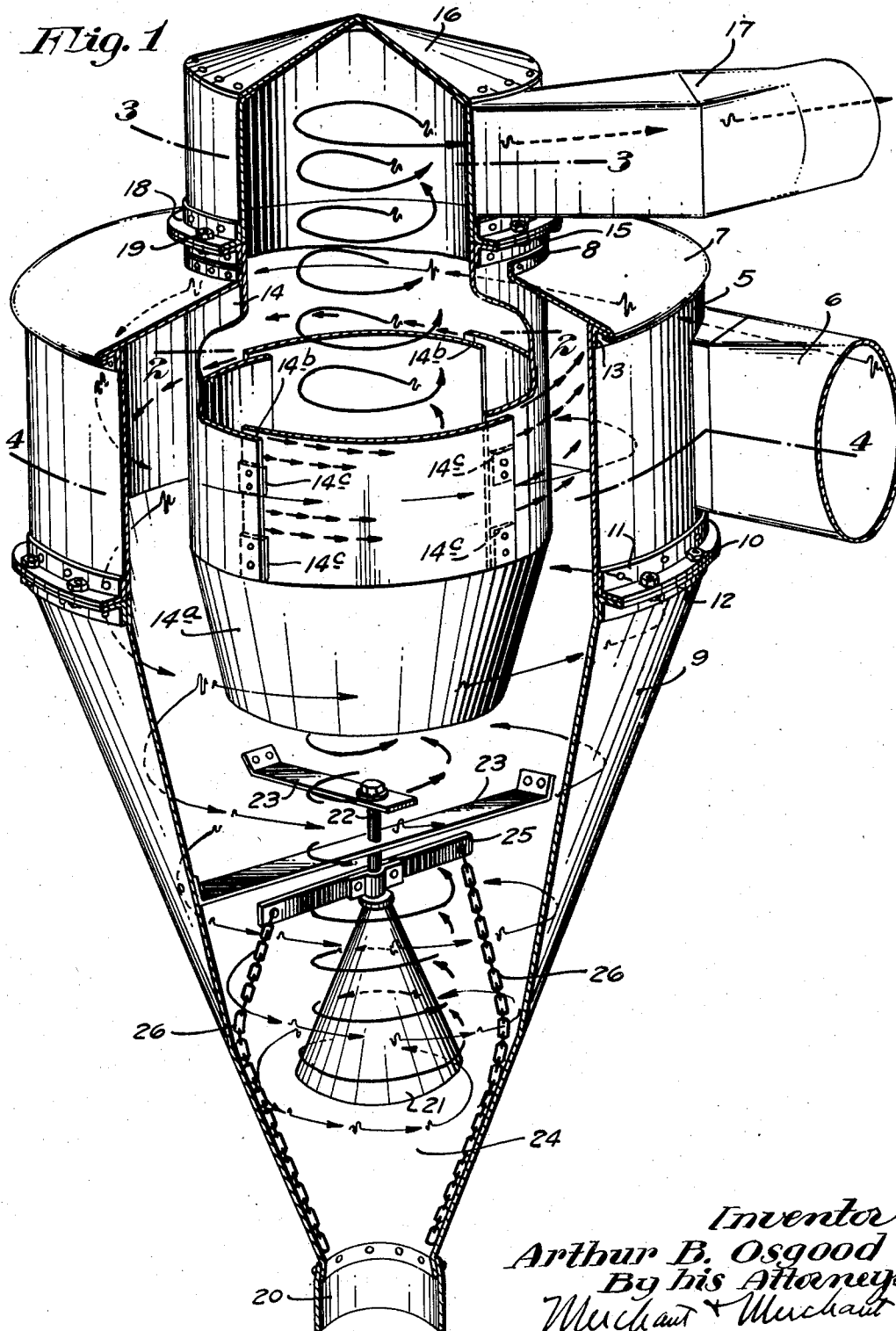
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2,153,270

DUST COLLECTOR

Filed April 21, 1938

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Fig. 2

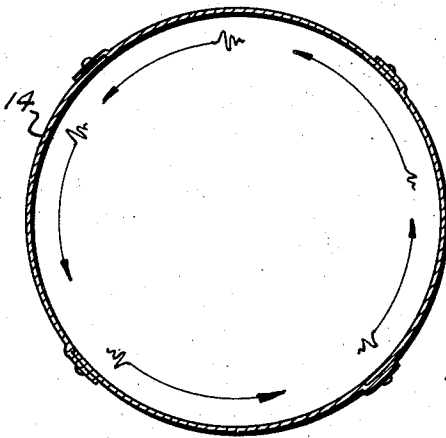


Fig. 3

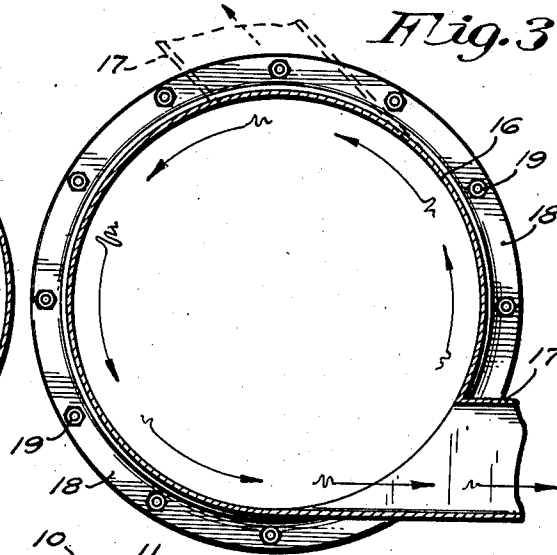
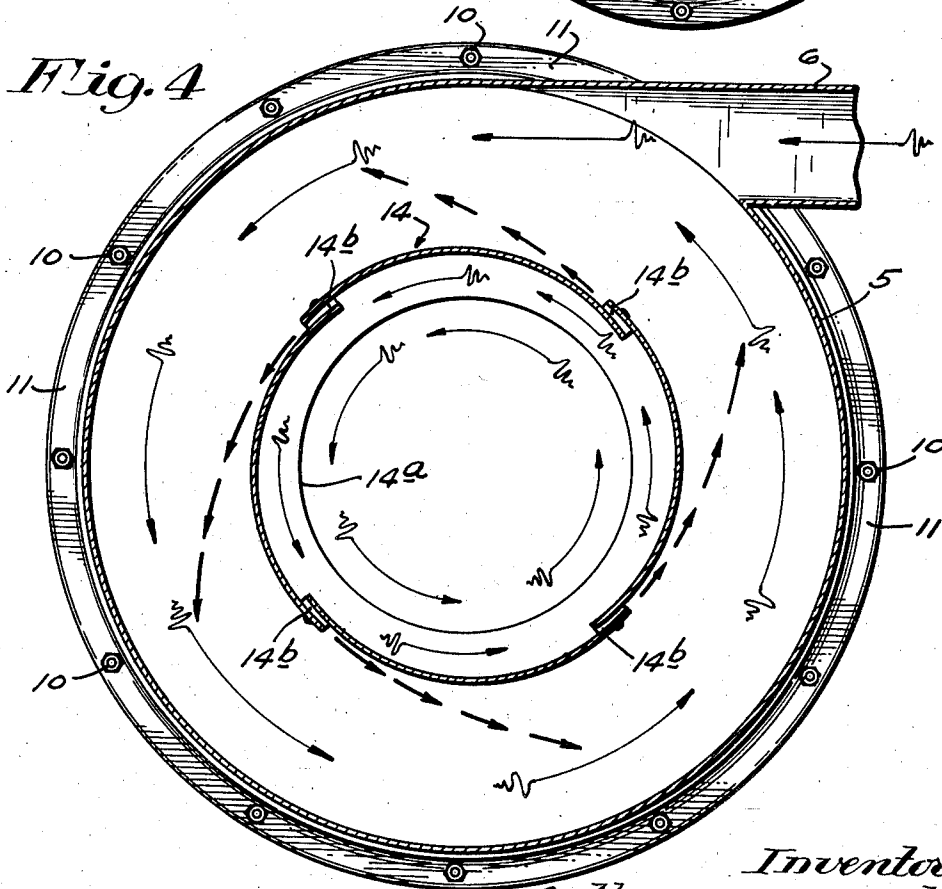


Fig. 4



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DUST COLLECTOR

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1 Claim. (Cl. 183-83)

My present invention relates to dust collectors of the so-called cyclone or centrifugal type, and generally stated consists of novel devices, combination of devices and arrangements of parts hereinafter described and defined in the claim.

The general purpose of dust collectors of this type is too well known to require much introductory comment. Stated in a general way the invention has for its object simplicity and low cost of construction, ready adaptability to various positions and conditions and increased efficiency in the dust collecting action.

The construction and arrangement whereby the objects above generally stated are accomplished will be made clear and will be more apparent after first having described the invention in a commercial form illustrated in the accompanying drawings wherein like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a perspective view with parts broken away in sections showing the improved dust collector;

Fig. 2 is a horizontal section taken on the line 2-2 of Fig. 1 showing only the parts on the said section line;

Fig. 3 is a horizontal section taken on the line 3-3 of Fig. 1 showing only the parts on or closely adjacent to the said section line; and

Fig. 4 is a horizontal section taken on the line 4-4 of Fig. 1 showing only the parts on or closely adjacent to the said section line.

The entrance chamber of the dust collector is formed within a cylindrical shell 5 which has a tangential air inlet spout 6 and an annular cover plate 7 which latter, at its inner edge, is shown as terminating in an upturned annular flange 8.

Secured to and extending below the cylindrical shell 5 is a downwardly tapered conical shell 9, the axis of which is concentric to the axis of the cylindrical shell 5. The large upper edge of the conical shell 9 is co-incident with the lower edge of the shell 5 and may be rigidly secured thereto in various ways, but preferably is detachably secured thereto. This detachable connection, as shown, is made by nut-equipped bolts 10 passed through annular angle flanges 11 and 12 riveted or otherwise rigidly secured to the said shells 5 and 9. The outer edge of the annular cover plate 7, as shown, is clinched around an annular angle flange 13 bolted, riveted or otherwise rigidly secured to the upper edge of the cylindrical shell 5.

Concentrically located within the cylindrical shell 5 is a stack 14, the upper edge of which, as shown, extends slightly above the flange 8 and is

there provided with an outwardly projecting annular angle flange 15. The extreme upper edge of the stack 14 is co-incident with the cylindrical walls of an inverted cup-shaped dome or bonnet 16 that has a tangential outlet spout 17. This dome or bonnet is rotatively adjustable in respect to the stack so that the spout 17 can be set at any angle in respect to the intake spout 6. This rotative adjustment may be accomplished in different ways as by a swivel, but as shown, the adjustment is accomplished by providing the dome at its lower edge with an outstanding annular angle flange 18 that is adjustably but rigidly connected to the annular flange 15 by nut-equipped bolts 19.

Previously and as illustrated, the stack 14 is of the same diameter as the dome or bonnet 16 and, of course, is of very much less diameter than the cylindrical shell 5. As an important feature the stack 14 is extended to a plane considerably below the lower edge of the cylindrical shell 5 and the upper edge of the conical shell 9. Also, as a further feature the depending portion of the stack is in the form of a downwardly detachably tapering truncated cone 14a, the surface of which is concentric to the surrounding portion of the conical shell 9.

As a further and very highly important feature the main body portion of the stack is provided with tangential dust discharge passages which, as will presently be noted, produces a skimming action of the dust from the air. The preferred way of accomplishing this is to form the body of the stack 14 of a plurality of cylindrical segments overlapping to form shallow skimmer passages or outlets 14b and spaced by tie block 14c riveted to the overlapping sections. As shown, the body of the stack is made up of four segments, but the number may be increased or decreased. Preferably the conical skirt or lower end portion 14a of the stack is continuous or unbroken. In practice the skimmer passages are generally about one-sixteenth of an inch in width but that dimension may be varied according to the size of the apparatus.

The conical shell 9, at its lower end, terminates in a contracted discharge spout 20 which may lead to any suitable place of deposit. The device so far in detail is an operative structure. However, for various purposes the operation of the device can be improved by the addition of certain auxiliary devices shown in Fig. 1 as located in the lower part of the conical shell 9.

To partly cut off the upper and lower space in the conical shell 9 and to insure a substantially

dead air space at the bottom thereof, there is interposed a baffle in the form of a cone 21 that is concentrically located within the shell 9. This conical baffle, at its upper end, is shown as secured to an axial upwardly projecting stem 22 which, as shown, is rigidly supported by cross bars 23, the ends of which are riveted or otherwise anchored to the interior of the shell 9. This baffle 21 is so spaced from the lower portion of the shell 9 that only a quite shallow annular passage is left in communication between the upper portion of the shell 9 and the substantially dead air space 24, that is in direct communication with the discharge spout 20.

In practice it has been found that dust will tend to adhere to and accumulate on the interior of the lower portion of the conical shell 9. To prevent such accumulation, I provide a rotary cleaner, which in the preferred arrangement illustrated, involves a rotary vane in the form of a flat bar 25, to the ends of which are attached loosely depending scraper chains or cables 26. The operation of this cleaning device will be described later on.

The operation of the device or apparatus in the air cleaning and dust collecting operation is substantially as follows:

The dust laden air under pressure will be blown through the intake pipe or tube 6 and delivered tangentially into the cylindrical shell 5. The air thus introduced under pressure will, under high velocity, be caused to travel against the interior of the cylindrical shell, partaking of a spiral movement with downward trend. After making several circuits around the interior of the shell 5, the dust laden air will be caused to continue a spiral downward travel against the interior of the conical shell 9; and as the dust laden air progressively moves downward within said conical shell its travel per feet per minute, while remaining approximately constant, will increase in the number of complete convolutions that it makes per minute. Of course, under the above noted spiral rotary movements of the dust laden air, the dust or heavy particles will be caused to travel against the shells and will progressively move toward the bottom of the shell 9.

From the foregoing description of parts it will be seen that air finds its only outlet as it is upwardly whirled through the stack and dome by the action of the tangential outlet spout 17 through which it is discharged. The downwardly projecting cone 14a of the stack positively prevents any of the air from changing its downward course and movement into the stack until after it has passed below the cylindrical shell and well downward into the conical shell. Moreover, most of the dust laden air will be caused to travel against the interior of the shell 9 until it reaches the space around the baffle 21 which cuts off further downward travel of the air and causes the same, while continuing its rotation in the constant direction, to partake of an upward trend into the stack. The major part of the dust, in fact all of the heavier particles, will be precipitated from the air downward into the dead air space 24 before the air takes its upward spiral course; but some of the lighter dust will be carried by the air upward into the stack. As this air, with the remaining light dust, is caused by centrifugal force to cling against the interior of the stack, it will be repeatedly delivered against the shallow skimming passages 14a which will cause the dust to be discharged back into the

main annular channel formed between the stack and the cylindrical shell. In this way all, or practically all, of the dust carried upward by the air will be delivered back into the main air stream for re-separation. The skimming channels 14a are so shallow that the outer passage of air therethrough with the dust will be very slight. Substantially one hundred per cent clean air will reach the dome 16 from which it will be discharged tangentially through the spout 17.

It will be noted, by reference particularly to Fig. 4, that the overlapping of the segments of the stack and the arrangement of the skimming passages therein is such that the air delivered tangentially into the cylindrical shell 5, through intake pipe 6, will cause the air to whirl in a counter-clockwise direction and produce more or less suction through the skimming passages 14a. This action is clearly indicated by the arrows marked on Fig. 4.

As indicated by arrows on Fig. 1, the whirling air will operate on the bar or vane 25 and cause the same to rotate, thereby causing the chains or cables 26 to be thrown outward against the interior of the lower portion of the conical shell 9 and produce a scraping action that will keep the latter free from accumulated dust.

In the structure described, the dome 16 constitutes an upward extension of the stack which, for reasons described, is preferably made rotatively adjustable. To secure the best results, the outlet tube 17 should have at least as great or preferably a little greater cross section and air conducting capacity than inlet tube 6.

In the above described preferred arrangement, the dome, the cylindrical shell, the conical shell, the stack and the baffle have a common axis. That is, they are in concentric arrangement in respect to a common axis.

While the preferred form has been described, it will, of course, be understood that various alterations and changes in the features disclosed may be made within the scope of the invention herein described and broadly claimed.

What I claim is:

A dust collector comprising a casing having annularly spaced inner and outer cylindrical walls connected by a substantially horizontal cover or top wall and providing therebetween an unrestricted annular passageway, said inner and outer walls being formed adjacent said top wall with tangentially disposed discharge and inlet openings respectively which openings communicate with said annular space to discharge therewithin in the same direction, said outer wall having a constricted lower dust receiving portion depending below the lower open end of said inner cylindrical wall whereby to provide an air outlet stack centrally through said casing, and said stack being provided with a dome the side wall of which is a substantial continuation thereof above said top wall and having a tangential outlet leading therefrom over said top wall to cooperate with said tangential inlet in causing air under treatment to whirl violently through said annular air passage and also throughout said central outlet stack, whereby dust entrained with the air in said central stack will be thrown against the inner wall of said stack and expelled therethrough into the whirling incoming air stream in said annular passageway for further separation therefrom.

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