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M. J. WATSON

2,074,818

CYCLONE DUST COLLECTOR

Filed Aug. 14, 1936

Fig. 2.

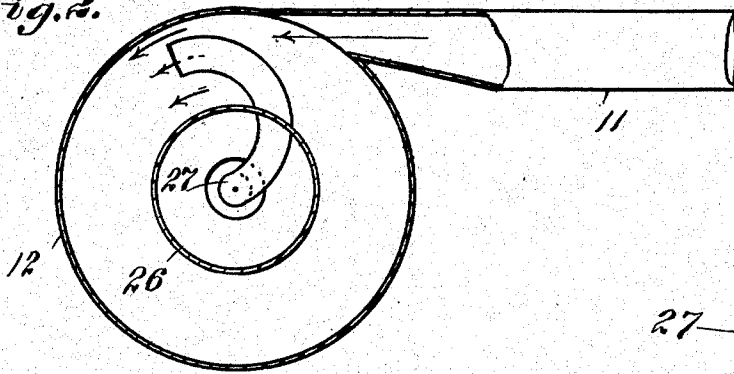


Fig. 1.

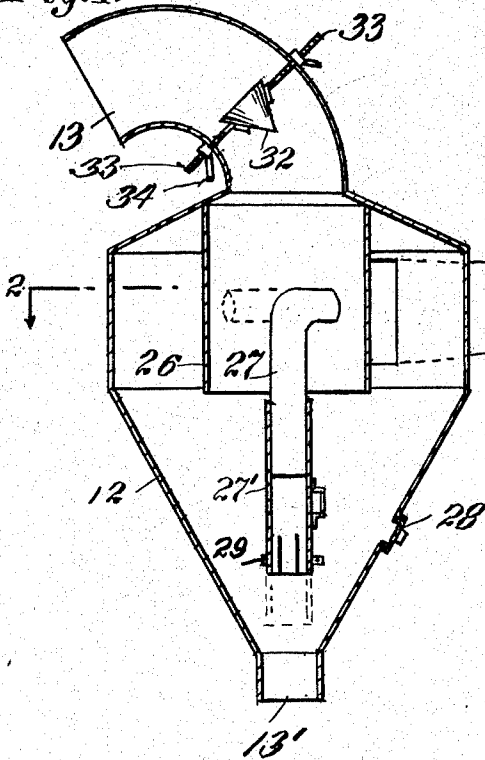


Fig. 3.

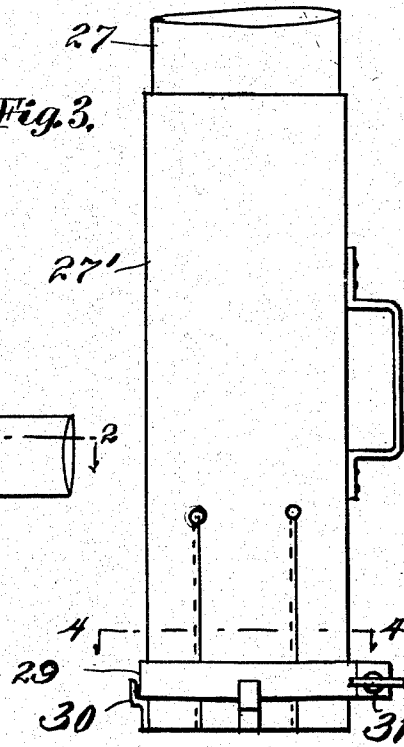
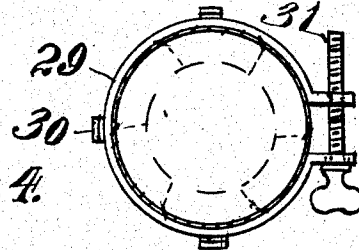


Fig. 4.



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UNITED STATES PATENT OFFICE

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CYCLONE DUST COLLECTOR

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6 Claims. (Cl. 183—83)

This invention relates to certain new and useful improvements in cyclone dust collectors, the peculiarities of which will be hereinafter fully described and claimed.

5 This application is a continuation in part of my pending application for sifter systems, Serial Number 51,045, filed Nov. 22, 1935.

The main objects of my present invention are to provide means first, for preventing the escape 10 of the finest particles in material-laden air through the tubular and upper discharge pipe for the purified air in a cyclone dust collector; second, for relieving the air pressure of condensation near the bottom discharge opening of 15 the collector; and third, for improving the operation of said collector.

In the accompanying drawing in which like reference numerals indicate corresponding parts,

Fig. 1 represents a central vertical sectional elevation of a collector exemplifying my improve- 20 ments;

Fig. 2, a horizontal section on the line 2—2 of Fig. 1;

Fig. 3, an enlarged side view of the lower end 25 of my central pipe showing an adjustable sleeve; and

Fig. 4, a horizontal section of the same on the line 4—4 of Fig. 3.

Referring to the drawing, the usual or any suitable form of cyclone dust collector, has a 30 conical lower portion 12 with a lower discharge opening 13' for the separated material and a cylindrical upper portion with a tangential inlet pipe 11, and a tubular 26 with a discharge pipe 13 for the surplus air that often carries out some 35 of the finest particles of material.

The velocity of the particle-laden air entering the upper portion of the collector is substantially unchanged when the air-carried particles change 40 from their straight tangential entering direction to a circular movement by which a centrifugal action is exerted on the particles causing them to hug the inner wall of the collector chamber. As the diameter of this downwardly tapering cone 45 decreases, the tangential velocity remains substantially uniform, but the number of R. P. M. increases, while the particles spiral downward, causing practical separation of the pulverized material from the vehicular air and compression 50 of the latter which seeks exit through the small bottom opening 13' and upward through the tubular 26 and its discharge pipe 13. The momentum of the pulverized material and its vehicular air due to their velocity as they spiral 55 downward in the constantly diminishing cham-

ber of the tapering cone, causes compression of the air.

The lightest particles are not as readily separated by centrifugal action from the whirling air currents as the larger particles, and are thus liable 5 to be carried out the discharge pipe 13 with the surplus air, unless the diameter of the tubular bears a certain definite relation to the compressed air pressure which would avoid such loss. 10 In the usual more or less approximation to this perfect proportion, many of these lightest particles would escape through the air discharge opening. It is to avoid such loss that I provide means by which most of these lightest particles 15 are taken out of the whirling air currents at or near the point of greatest compression near the bottom outlet of the cone, and are returned by a communicating pipe to a point in the upper part of the collector where they will again mingle 20 with the particle-laden air currents of the tangential inlet.

The air pressure is also distributed by this return pipe 27 which is open at both ends to the 25 inside of the collector. Its lower end is located adjacent the lower opening 13' in the vertical axis and vortex of the whirling currents, and extends upward in said axis into the tubular above the bottom edge and then curves outward horizontally through the wall of the tubular adjacent 30 the tangential inlet, so that its upper end is surrounded by the entering currents and is pointing the same way. These currents thus assist the pressure in the lower part of the collector by a suction at the upper end of the pipe 27.

The lower end of said pipe has an adjustable 35 sleeve 27' operated by hand through a capped hole 28 in the side of the cone. The lower end of said sleeve has slit sections that can overlap each other by tightening a compression band 29 held from slipping off by hooks 30, when a 40 screw 31 is tightened by hand to reduce the size of the lower end of the sleeve and regulate upward movement in the pipe. The compressed air pressure is thus relieved and the upward flow of surplus air through the tubular is lessened and 45 also the loss of finest particles.

At the inner end of the discharge pipe 13 I also mount a conical deflector 32, supported by 50 rods 33 extending outward through the walls of the pipe 13, having threaded ends and handle nuts 34 by which said deflector is adjusted to 55 deflect any light particles in the outgoing air from the center flow outward against the adjacent walls. Such deflected particles being driven out of the central current and striking the adja-

cent walls, will tend to drop back into the collector instead of passing out the pipe 13.

I claim:

1. A cyclone dust collector having a tangential 5 inlet, upper and lower discharge openings, and a tubular in the upper portion, and characterized by a vertical pipe located in the axis of the conical lower portion of the collector having its lower end located near the lower discharge opening 10 and extending upward into the tubular and then curved outward through the wall of the tubular and having its upper end curved in the same direction as the material-laden air currents entering from the tangential inlet so that said upper 15 end is surrounded by said currents which exert suction on said pipe, substantially as described.
2. A cyclone dust collector having a tangential inlet for entering material-laden blast air, and having upper and lower discharge openings sub- 20 ject to exit of the finest particles and characterized by an interior vertical pipe having its upper end curved parallel and pointed in the same direction as the currents of entering material-laden air, and having its lower end provided with a 25 sliding sleeve to locate it adjustably in the axis of the collector, substantially as described.
3. A cyclone dust collector having an upper tangential inlet for material-laden air currents, a lower discharge outlet for separated material, 30 and a tubular having an upper outlet for discharge of surplus air and subject to loss of finest particles, and characterized by a vertically dis-

posed pipe open at both ends inside the collector, its upper end located in the path of, and pointed in the same direction as said entering currents, and its lower end having a variable sized inlet located adjacent said lower discharge outlet, and means to vary the size of said lower end inlet, substantially as described. 5

4. A cyclone dust collector as in the immediately preceding claim, said lower end of the vertically disposed pipe provided with a slidingly 10 adjustable sleeve extension having slit sections at its lower end adapted to overlap at the slit edges under compression to vary the size of the inlet, and compression means for said slit sections, substantially as described. 15

5. A cyclone dust collector having in combination, a vertically disposed pipe extending upward in the axis of the collector and then curved into the entering stream of air currents surrounding its upper outlet end to exert suction on said pipe, 20 the lower inlet end having slit sections, and a compression band around said sections with a tightening screw to vary the size of the inlet end, substantially as described.

6. A cyclone dust collector having in combination 25 an outlet pipe subject to loss of fines in the surplus air therethrough, characterized by a deflecting cone adjustably mounted in said pipe, supporting rods having threaded ends extending outward through said pipe, and handle nuts on said ends, substantially as described. 30

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