

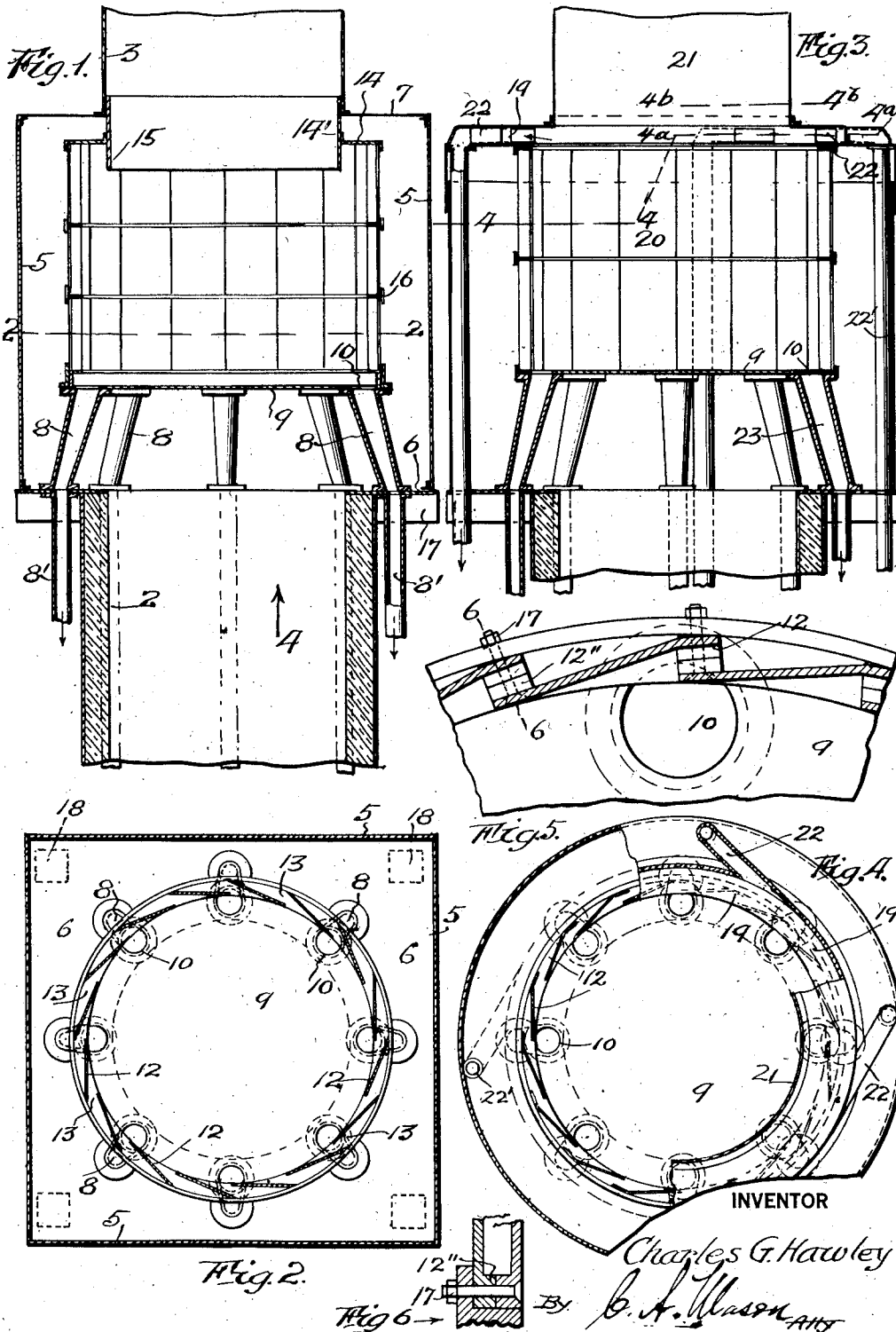
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CENTRIFUGAL DUST SEPARATOR

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CENTRIFUGAL DUST SEPARATOR.

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My invention relates to dust collectors or dust catchers with special reference to means for intercepting, collecting and discharging dust particles from a flowing stream of air or gas, for example, as required for preventing the discharge of dust from cupolas, smokestacks and other furnace outlets.

Primarily the invention embodies and adapts to such uses the centrifugal separator or fluid purifier which appears in some of my earlier applications.

The present invention will be clearly understood on reference to the drawings that form part of this specification, and in which—Fig. 1 is a vertical section of a dust catcher embodying the invention; Fig. 2 is a horizontal section thereof on the line 2—2 of Fig. 1; Fig. 3 is a vertical section of the device or apparatus in a modified form which includes a top race to supplement the work done at the bottom of the centrifugal element; Fig. 4 is a compound horizontal section partly on the line 4—4 of Fig. 3, and partly on the line 4a—4a thereof, and partly on the line 4b—4b thereof; Fig. 5 is an enlarged cross-section illustrating a preferred method of attaching the tuyère blades one to the other; and Fig. 6 is a vertical section on the line 6—6 of Fig. 5.

In Figs. 1, 2 and 3, there is represented the lower and upper sections of a stack. The gases therein rise in the direction of the arrow 4. Between the sections 2 and 3 I interpose the preferably rectangular enlarged section or casing comprising the side walls 5, the bottom 6, and the top 7. This casing contains the centrifugal unit or apparatus which serves to separate the dust from the rising gases.

The parts 8 are hollow legs rising from the floor 6 at points outside the stack 2. These legs support the disk 9, the peripheral portion of which rests upon the tops of the legs 8. The disk or bottom 9 has openings 10 that correspond to the tops of the hollow legs 8. On the part 9 is a low ring 11 which preferably slightly overlaps the openings 10 therein.

Rising from the ring 11 is a tall tuyère ring or barrel composed of a circumferential series of operatively overlapping tangential tuyère blades 12. These present a plurality of slit-like vertical tuyères 13 of an aggregate area substantially equaling but prefer-

ably somewhat exceeding the cross sectional area of the stack section 3.

The ring of tuyères, as well shown in Figure 1, is of considerably greater diameter than the stack section 3, and at the top the space between these parts is closed by a top ring or annular abutment portion 14. The part 15 is a collar that connects the interior of the tuyère ring with the stack 3. The part 15 may obviously be eliminated by combining the parts 7 and 14. But the structure illustrated is preferred because it better accommodates and permits the independent expansion and contraction of the external casing and the contained centrifugal device. In practice, therefore, the junction between the parts 14 and 15 is a sliding joint 14'.

Quite high temperatures are encountered where these devices are used at the tops of cupolas and the like, and, in such cases, it seems to be desirable to make the tuyère blades 12 of cast iron which best resists the high temperatures and oxidation. It seems not to be feasible to make blades of such length in single pieces, and, therefore, in accordance with my invention each group may comprise two or more sections having their ends joined by intermediate (and also sectional) cast metal rings 16.

Most conveniently, the ends of the blades are provided with integral spacing lugs 12''. As well shown in Figures 5 and 6, these lugs are made to contain the radial bolts 17 by which succeeding blades are fastened together and to respective parts 11, 16 and 14. Down spouts or pipes 8' lead from the lower ends of the hollow legs 8.

As the structure comprising the parts 5 to 16, inclusive, is usually of too great a weight to be superimposed upon the stack section 2, I arrange for its support by a suitable underframe 17 and suitable vertical columns 18, the latter being shown by dotted lines in Figure 2.

Angular gas passages are provided within the rectangular casing and the dust carrying gases on reaching the externally open tuyères 13, enter the tuyère ring tangentially and with such velocities as to set up a rapid whirling motion of the gases therein. Such subdivision of the flowing stream of gases positions all the dust particles directly adjacent the inner surfaces of the tuyère ring,

that is, against the inner sides of the circumferential series of tuyère blades 12. The dust particles are virtually retained in that position while whirling within the tuyère ring, and, due to the presence of the annular abutment or ring 14, the gases are caused to reverse their normal flow toward the stack or outlet 3 and to travel first downward toward the tuyère bottom 9. Coacting at that point the gases whirl upwardly along the axis of the tuyère and thence escape to the stack 3. But meantime the whirling action and the downward motion of the gases causes the collected dust to accumulate at the periphery of the tuyère bottom and there it finds a free gravity discharge through the hollow legs 8 and down pipes 6. In this manner, and by this simple means I have succeeded in the task of preventing the discharge of dust from such stacks.

As will be apparent, the dust is usually collected in a suitable box or trap at the lower ends of the down pipes 6.

The construction illustrated in Figures 3 and 4, is substantially identical with that above described, and acts in the same way, but contains an added part, and has an added function. In dealing with very fine dusts of light weight, there is a tendency to carry the lighter particles past the ring 14 and into the stack. To avoid this difficulty, I add a top race or groove 19 to the centrifugal dust collecting unit. This race is concentric with the tuyère ring 20 and the stack 21, and is directly interposed between these parts. 22—22 are tangential dust discharge spouts leading from the periphery of the race 19. In operation, the heavier dust collects and whirls downward to the bottom of the centrifugal unit and is discharged through the hollow legs 23, while the lighter dust whirls upward and, reaching the top of the tuyère ring, quickly expands into the still larger circular race 19. From thence it is immediately discharged through the peripheral outlets 22 and is thus got rid of, leaving only the clean gases to escape through the stack.

In cases where the stack 2 and the vertical extension afforded by the dust catcher is

sufficient to create adequate draft the top extension 3 may be omitted, in which case the purified gases reach the outer atmosphere directly from the top of the centrifugal dust catcher.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A vertical duct, in combination with a casing for receiving the gases therefrom, a centrifugal dust separating unit having an unobstructed central portion throughout the unit; positioned within said casing to in turn receive the gases from the outer parts of said unit, said unit and casing having a substantially common top containing the gas exit opening, and said unit being characterized by dust discharging means at its bottom.

2. A vertical duct, in combination with a casing located to receive the gases therefrom, a centrifugal dust separating unit positioned within said casing to receive the gases from the latter, said unit and casing having a substantially common top containing the gas exit opening, and said unit being characterized by dust discharging means at both its bottom and its top.

3. A vertical duct, in combination with a casing erected thereon to receive the gases therefrom, a centrifugal dust separator within said casing to in turn receive the gases, an opening being provided for the escape of the gases at the top of said separator, said separator having a bottom, legs rising from said stack and supporting said bottom and the upper ends of said legs opening downward through said bottom of the catcher for the discharge of the dust.

4. A vertical duct, and a casing erected to receive the gases therefrom, in combination with a centrifugal dust separator, positioned within and in turn receiving the gases from the outer parts of said casing, said casing and element having a gas outlet opening at the top, a circular dust receiving race immediately below said opening, and means for discharging the dust from said race.

In testimony whereof I have hereunto set my hand this 30th day of April A. D. 1925.

CHARLES GILBERT HAWLEY.