

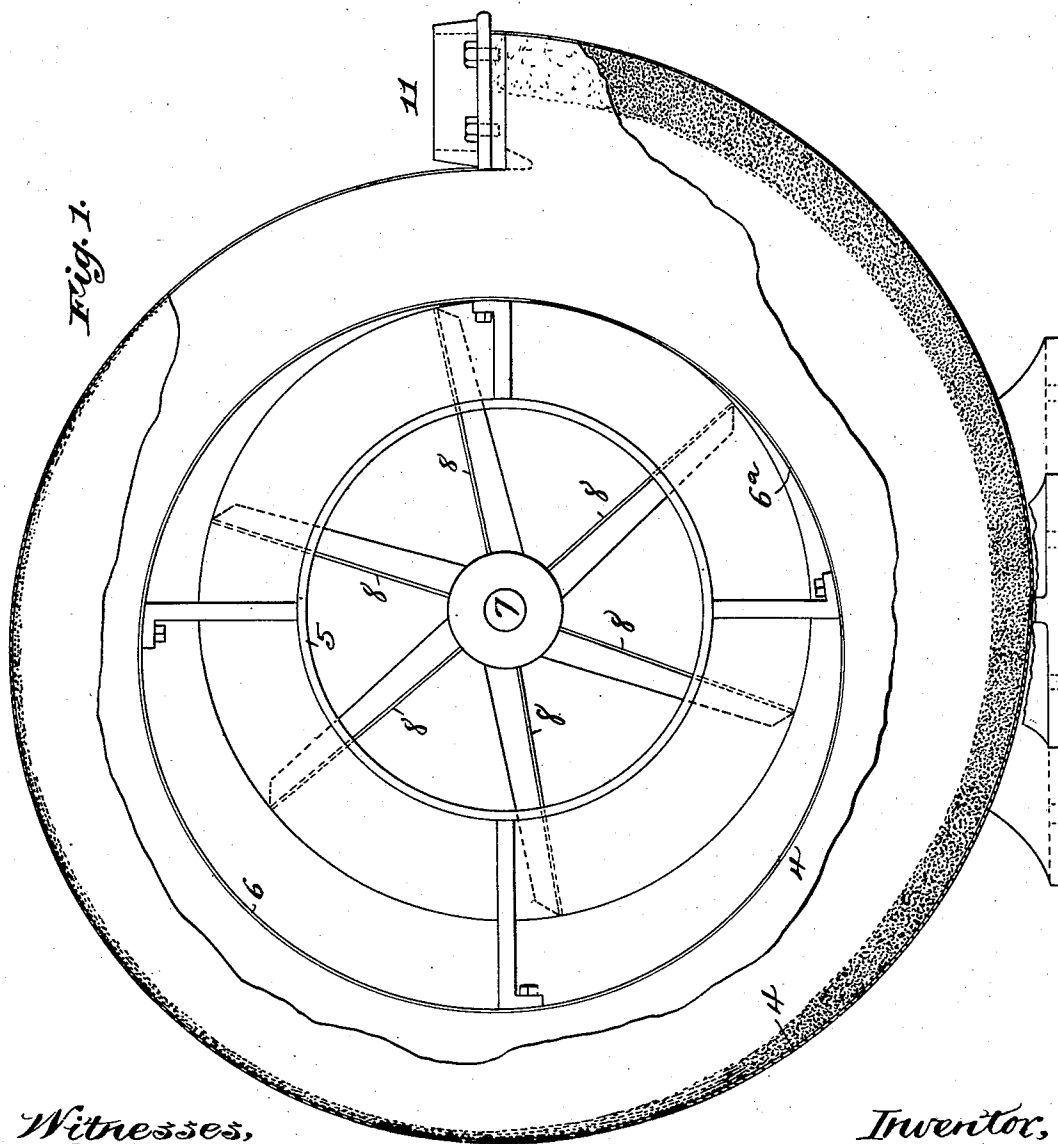
(No Model.)

3 Sheets—Sheet 1.

W. R. MARSHALL.
FAN CONCENTRATOR.

No. 566,000.

Patented Aug. 18, 1896.



Witnesses,

J. S. Mann.
E. L. Huber.

Inventor,

William R. Marshall
By *Offield Towle Luthicam,*
Atty.

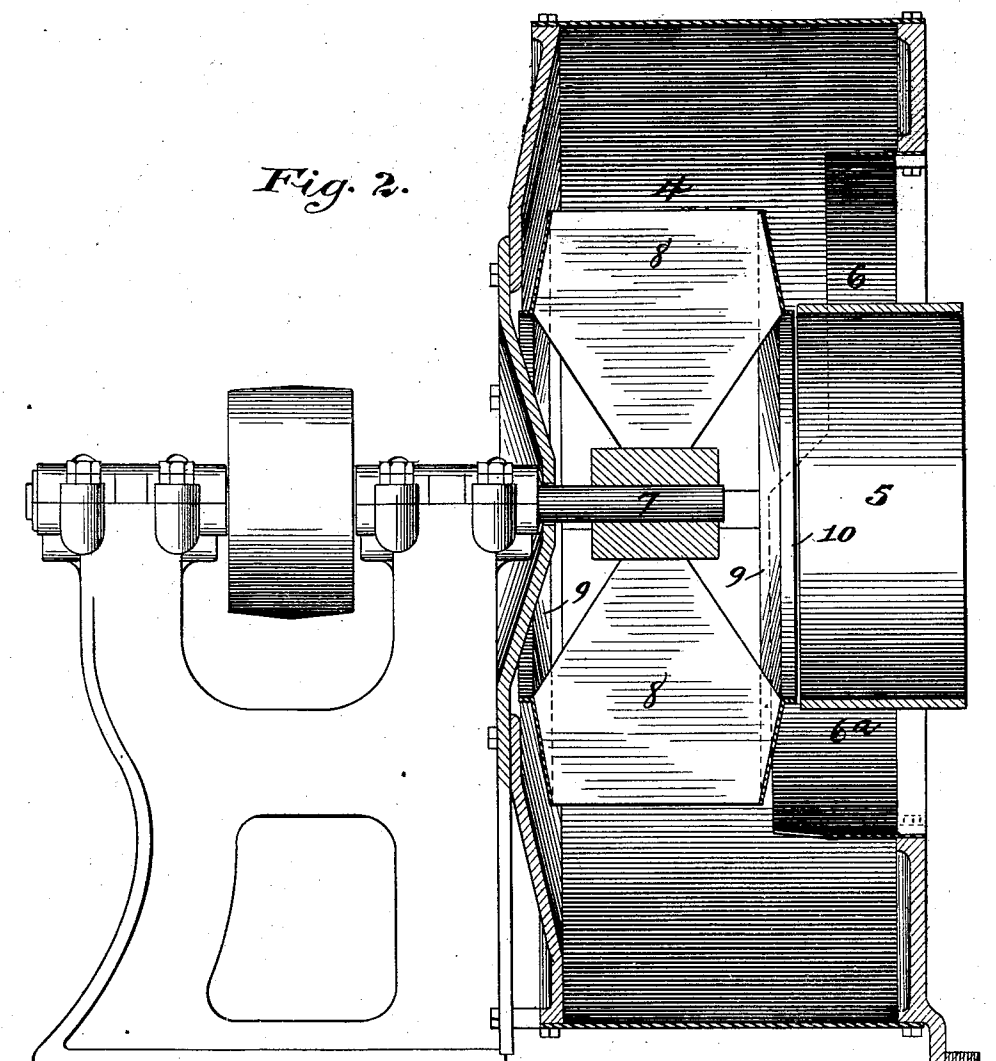
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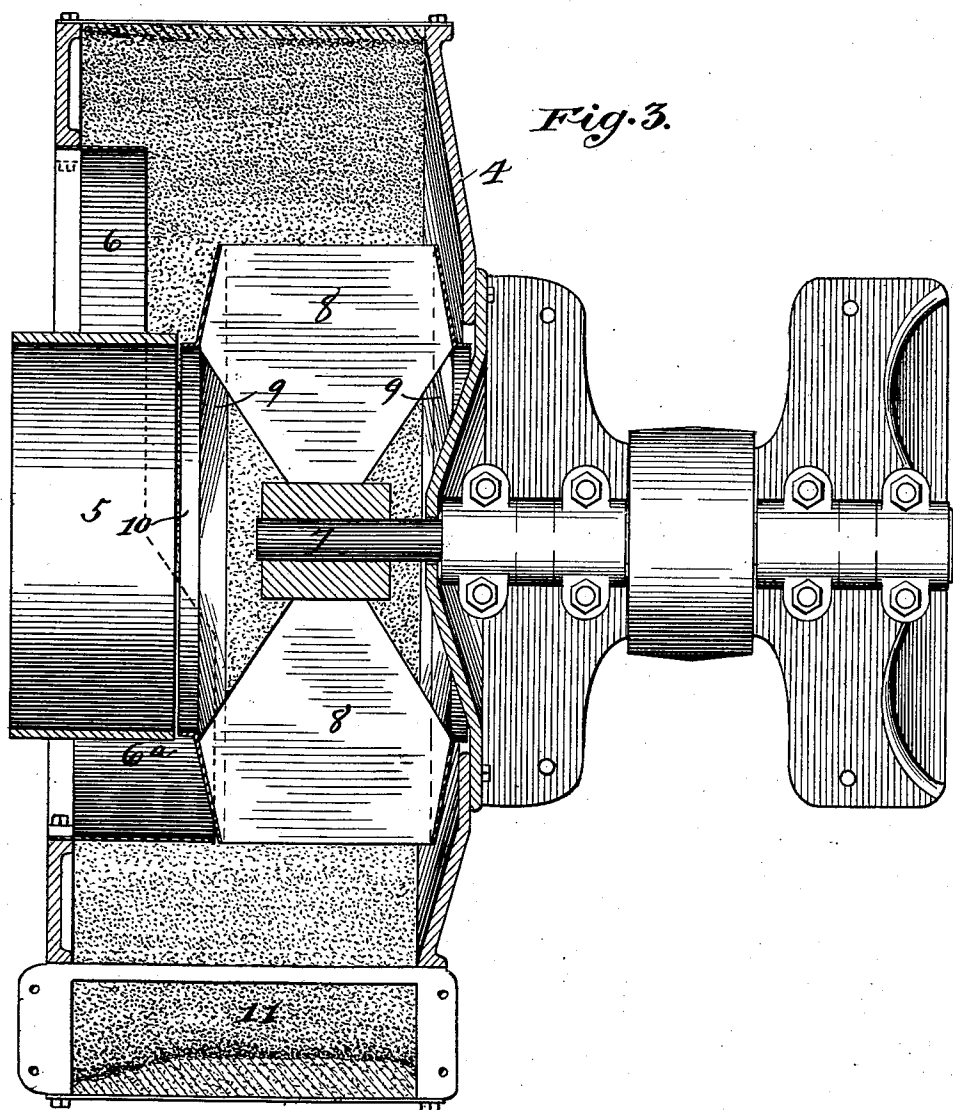
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UNITED STATES PATENT OFFICE.

WILLIAM R. MARSHALL, OF EAST SAGINAW, MICHIGAN.

FAN-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 566,000, dated August 18, 1896.

Application filed May 2, 1896. Serial No. 589,948. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. MARSHALL, of East Saginaw, Michigan, have invented certain new and useful Improvements in Fan-Concentrators, of which the following is a specification.

This invention relates to an improvement in fan-concentrators which are used for handling dust-laden air-currents, and which operate to concentrate or mass the dust carried in such currents while permitting certain proportions of the air freed from dust to escape from the fan. Structures of this general type are shown in my Patents Nos. 550,796 and 550,797, issued December 3, 1895.

The object of my present improvement is to adapt this fan-concentrator for heavy work in which large volumes of solid material and of considerable specific gravity are handled.

My improved fan-concentrator is not only applicable to situations to which those previously described were not applicable, but it also has a greater efficiency than the fan-concentrators previously provided.

In structures of this kind an air-escape opening has been provided in the side of the fan-case concentric to the axis of the fan, and in this construction owing to the relative positions of the fan-wheel and purified-surplus-air outlet the escape of air was equal on all sides or at all points of the periphery of the fan-wheel.

The plan of construction heretofore followed omitted from account the gradually increasing labor imposed upon the fan-wheel in making a complete revolution, which increasing labor is due to the gradual increase in the volume or mass of solid particles which are concentrated upon the wall of the fan-case from the point of initial separation toward the dust-outlet. Said plan of construction also omitted to provide for the escape of the surplus air in increasing volume in proportion as it is freed from the solid particles and as it becomes no longer serviceable, or needed, as a carrier for the solid particles separated therefrom by centrifugal force.

My invention is based on the principle of varying the applied power of the fan-wheel and the escape of the surplus air in proportion to the progress of the separation of the dust from the carrying-current. In carrying

out the invention I arrange the surplus-air outlet and fan-wheel in such relation that their axes are not coincident, and while the specific arrangement may be considerably varied, according to the material to be operated upon, or according to the will of the constructor of the mechanical device, it will be found that this relative arrangement of fan-wheel and surplus-air outlet constitute the gist of the invention and produce the novel or useful results hereinbefore indicated.

My invention is shown in preferred embodiment in the accompanying drawings, in which—

Figure 1 is an elevation of the suction-inlet side of the device, a part of the fan-case being broken away and the extremities of the fan-blades showing in dotted lines. Fig. 2 is a vertical sectional elevation, and Fig. 3 a sectional plan.

In the drawings, 4 represents the fan-case; 5, the suction inlet-pipe; 6, a tubular guard surrounding said suction-pipe; 7, the fan-shaft; 8, the fan-blades, and 9 annular plates connected to the edges of the fan-blades, and having offset flanges 10, adapted to run close to the end of the suction inlet-pipe. 11 represents the dust-outlet. The tubular guard has a wider portion 6^a, which wider portion extends through an arc of about ninety degrees concentric to that portion of the air-outlet approaching and opposite the dust-discharge opening. The effect of this construction is to practically close the space between that portion of the outlet and the fan-wheel, so that the air is not permitted to escape through the surplus-air outlet, but must escape with the concentrated dust, serving thereby as a carrying-current whereby the concentrated mass is carried out of the fan-case and through the peripheral discharge-opening.

From an examination of the drawings it will be seen that the axis of the fan is eccentric to the axis of the air-outlet in the side of the fan-case, and, as shown in Fig. 1, the fan-shaft is located below the center of the air-outlet and nearer to the dust-outlet than to the fan-case at a point diametrically opposite such outlet.

In operation the dust-laden air-current is delivered through the suction inlet-pipe at

the eye of the fan and escapes between the revolving blades of the fan, whereby the current is given a rotary motion and the suspended particles of greater specific gravity than the carrying-currents are massed upon the periphery of the fan-case. This separation or concentration is, of course, effected gradually, and therefore the mass of separated particles is least in that portion of the chamber above a plane passing through the axis of the fan and the dust-outlet and between parallel planes passing through the axis of the fan and the dust-outlet respectively. This is indicated in Fig. 1, the separated mass being shown by stippling, the thickness of the layer gradually increasing from the point of initial separation to the point of discharge. The result of this relative arrangement of the fan-wheel to the surplus-air outlet is that the power of the fan is applied in the most effective manner during that portion of its revolution in which it is required to lift the separated mass to the dust-outlet, whereas but little power is required at the point where the separation begins, and the solid particles fall by their own weight from the upper to the lower portion of the chamber, being confined, of course, to the periphery of the fan-case by centrifugal force and the pressure to which the air-current is subjected by the fan-wheel.

It will also be noted that in this construction the fan-wheel is closed at its sides by the plates 9, and that the delivery is therefore at right angles to the axis of the fan. Further it will be observed that the surplus-air-escape opening is narrow at that point where the separation begins and gradually increases in width through an arc of about ninety degrees, and then gradually decreases toward that point at which the separation is theoretically completed. By the arrangement above described the power of the fan is employed in a most effective manner, and the separation is closer than is possible where the purified-

air outlet is truly concentric to the axis of the fan, so that the air has equal opportunity to escape at all points.

I do not, of course, limit my invention to precise arrangements shown, as numerous changes may be made in the structural features. For example, I have shown the fan-shaft as mounted eccentric to the case, but the fan-shaft might be mounted axially of the case and the surplus-air outlet formed eccentric to such axis.

I claim—

1. In a fan concentrator and separator, a fan-case having a lateral suction-inlet, a lateral surplus-air outlet and a peripheral outlet for the concentrated material, and a fan-wheel rotatably mounted within said casing, eccentrically to the axis of the surplus-air outlet, substantially as described.

2. A fan-concentrator comprising in combination a fan-case having a suction-inlet through its side wall, an outlet for air also in the side wall and a peripheral outlet for the concentrated and separated material, a fan-wheel mounted within said casing with its axis eccentric to the axis of the air-outlet, and a tubular guard arranged in the surplus-air outlet and of varying width, the wider portion of said tubular guard being in that portion of the fan-case adjacent to the peripheral discharge-opening, substantially as described.

3. A fan-concentrator comprising in combination a fan-case having a suction-inlet through its side wall, a surplus-air outlet also in the side wall and a peripheral outlet for the concentrated and separated material and a fan-wheel arranged with its eye adjacent to the suction-inlet and eccentric to the surplus-air outlet and to the transverse axis of the fan-case, substantially as and for the purpose described.

WILLIAM R. MARSHALL.

Witnesses:

WALTER E. MARSHALL,
C. F. REIMERS.