(No Model.) 2 Sheets—Sheet 1

W. A. COCKRELL.

DUST COLLECTOR.

No. 468,964. Patented Feb. 16, 1892.

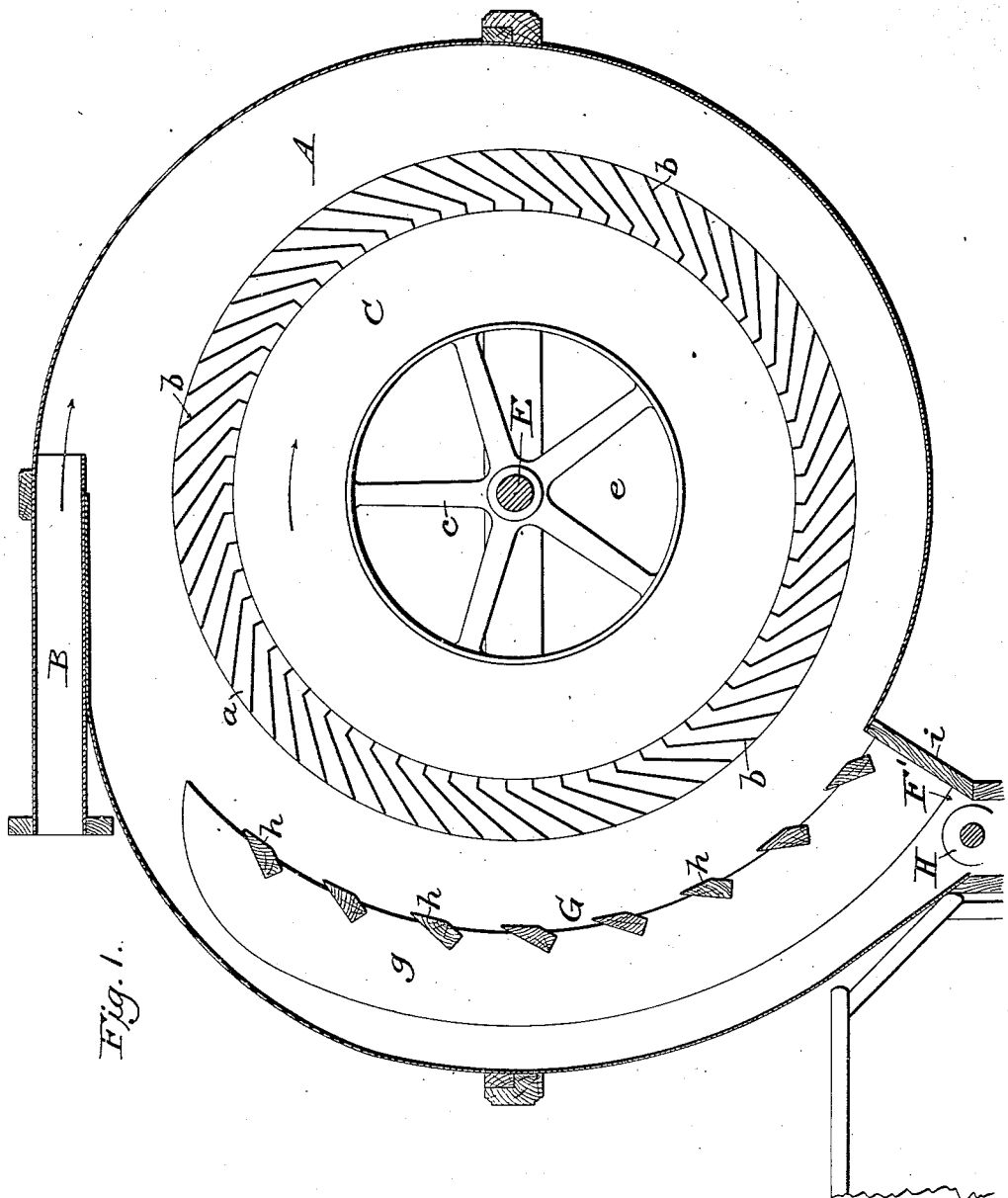


Fig. 1.

Witnesses
James F. Duhamel
Horace A. Dodge.

WILLIAM A. COCKRELL,
Inventor,
by Dodger & Sons,
Attys.

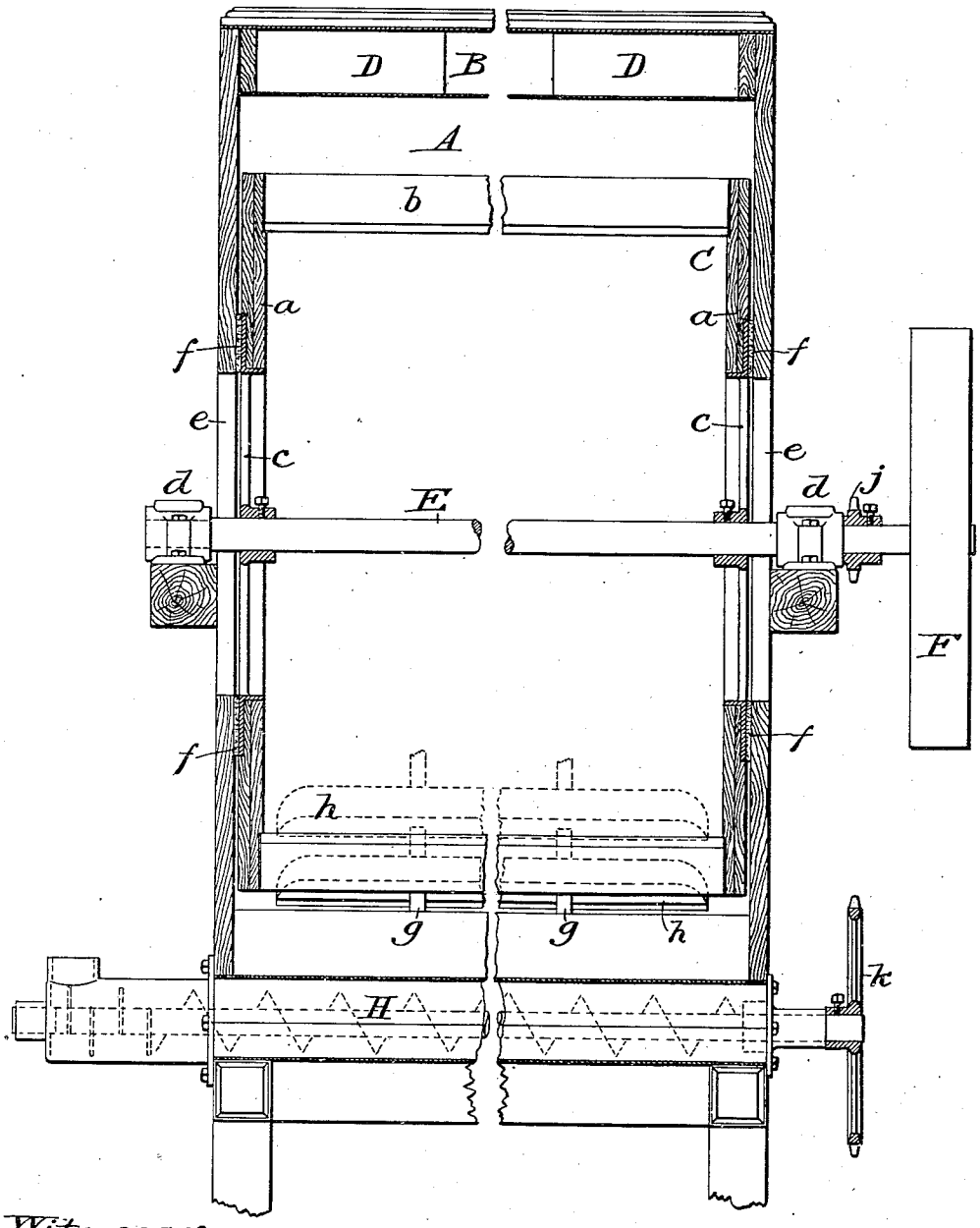
(No Model.) 2 Sheets—Sheet 2

W. A. COCKRELL.

DUST COLLECTOR.

No. 468,964. Patented Feb. 16, 1892.

Fig. 2.



Witnesses

James F. Duhamel.

Horace A. Dodge.

WILLIAM A. COCKRELL,

Inventor,

by Dodger & Sons,

Attys.

UNITED STATES PATENT OFFICE.

WILLIAM A. COCKRELL, OF MILWAUKEE, WISCONSIN.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 468,964, dated February 16, 1892.

Application filed October 23, 1891. Serial No. 409,575. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. COCKRELL, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Dust-Collectors, of which the following is a specification.

My invention relates to dust-collectors, and is designed as an improvement upon machines of the class set forth in Letters Patent granted to me September 3, 1889, and numbered 410,152. In its general construction the present machine resembles to some extent the one covered by the aforesaid patent—that is to say, it embodies a rotating drum or cylinder mounted within a dust-collecting chamber, into which chamber the dust-laden current is introduced tangentially, the drum being arranged to rotate in the direction of travel of the air-current for the purpose of maintaining the velocity thereof, and for other purposes hereinafter more fully set forth. In other particulars, which will be fully explained, the machine differs materially from that set forth in the patent.

In the annexed drawings, Figure 1 is a transverse vertical section through my improved machine; Fig. 2, a vertical section in line with the axis of the drum, the term "transverse" being used above upon the assumption that the machine will be of greatest length in the direction of the axis of the drum, though this is not essential, and may not be the case under some circumstances.

In the drawings, A represents a separating-chamber, the walls of which are of spiral or scroll form, as shown in Fig. 1, the axis of said scroll or spiral being horizontal. These walls may advantageously be made of sheet metal supported by suitable framing, and the ends may be formed of wood, sheet metal, or other suitable material, as convenience and cost of construction shall determine.

At a suitable point in the circumference of the shell or casing of the chamber A there is provided a tangential inlet-spout B, preferably opening at the top of the machine, and at a point slightly in advance of the vertical plane of the axis of a drum or cylinder C, which is mounted within the chamber A. The width of this spout may be greater or less, or boards or deflectors D may be provided for varying the width and shape of the inlet-opening, though in practice these are not deemed necessary.

The drum or cylinder C above mentioned consists of two circular heads *a*, connected by longitudinal blades, slats, or buckets *b*, and each carried upon spiders *c*, secured upon a shaft E, which shaft is mounted in boxes or bearings *d*, secured to the framing of the machine, and is furnished with a band-wheel F, through which it receives motion from any convenient source. The spiders *c* afford central openings for the escape of purified air, the end walls of the chamber A being provided with corresponding openings *e*, registering with the open spiders.

To prevent the passage of air between the heads *a* of the drum and the end walls of the chamber A, a suitable packing *f*, of felt, wool, or other suitable material, is provided, as shown in Fig. 2.

The blades, buckets, or slats *b* are advisably made of the form indicated in Fig. 1—that is to say, they present in cross-section a short radial face and a longer oblique face joining the radial portion at an angle of from thirty to forty degrees, more or less, to the former. In practice I find it advantageous to adopt an angle of thirty-five degrees to the radius of the cylinder, for reasons that will be presently explained. These blades are preferably made of Russia iron, and the object of bending them to the form indicated or of providing the short radial portion is to give stiffness to the blades and make them self-supporting without unduly increasing the weight of the machine by adding spiders or other supports. I desire it to be understood, however, that I do not restrict myself to Russia iron, nor in fact to any metal or material whatever for the construction of the blades, slats, or flights, as they may be made of any suitable material, wood answering a very good purpose.

The shaft E is placed eccentrically within the shell or casing A, so that the space between its circumference and the wall of the shell or casing A decreases gradually and constantly from the discharge end of the spout or inlet B to the conveyer-trough F′, which is located below the ascending side of the drum. The purpose of thus arranging the drum and

shaft eccentrically with reference to the shell or casing is to compensate for the loss of air by reason of its escape between the blades or flights of the drum or cylinder C and from the machine, the result of this arrangement being a practically uniform air-pressure through something more than one-half the circumference of the shell or casing.

Within the shell or casing A, at the front side or between the shell and the ascending side of the drum, at which point the casing is enlarged, there is placed a slatted rack G, consisting of curved boards *g* and horizontal slats *h*, arranged in a series curving to correspond to the curvature of the drum, as plainly shown in Fig. 1. Below the rack G is located the trough F′, into which material is directed by a gather-board *i* and the sloping wall of the shell or casing A. The conveyer H, working in said trough, serves to carry off to a suitable outlet any material which may be deposited in the trough. As shown in Fig. 2, the boards *g* are shorter than the drum or cylinder, and there is consequently a space left at either end of said boards between them and the end walls of the casing, through which heavy particles may pass.

Motion is imparted to the conveyer by means of a sprocket-chain passing about sprocket-wheels *j* and *k*, respectively, secured upon the shaft E and the conveyer-shaft, or by means of any convenient driving-band, gear, or the like, the method of driving being unimportant.

The machine being constructed as above set forth, its operation is as follows: Dust-laden air is blown in at the top of the machine through spout B over the top of the cylinder C and against the concave surface of the shell, whereby it is given a vortical or whirling movement within said chamber and about the cylinder. The cylinder being put in motion and given a circumferential speed approximately the same as that of the moving air-current causes the movement of the current to continue practically the same, the air escaping between the blades, flights, or slats *b* to the interior of the drum, and finally through the central spiders *c* and the openings *e* of the end walls of the casing to the atmosphere or to suitable flues or ducts which may be connected therewith, if deemed desirable. In practice, however, it is preferred to permit the escaping air to pass directly into the atmosphere.

The narrowing of the space between the cylinder C and the wall of the shell or casing A, as above explained, compensates in greater or less degree for the escape of air through the drum and causes the pressure to be practically or nearly uniform throughout said space; but upon arriving at the point where the gather-board *i* meets the casing the air enters an expansion chamber or space produced by the enlargement of the casing and permits the lighter portions floating therein to fall or settle into the space behind and below the slats *h*. The heavier particles carried by the air-current and falling around the outside of the drum or cylinder pass, mainly, toward the end walls of the chamber or casing A, and through the space between the ends of the slats or boards *h* and the end walls of the casing, and are finally delivered into the conveyer-trough F. The lighter floating-dust, which is the portion that the machine is primarily designed to collect, is found in practice to adhere to flat smooth surfaces, and it is by reason of this adhesion that I am enabled to effectively collect the same. As the air by reason of the pressure within the shell or casing passes inward between the blades, flights, or slats *b* of the cylinder C, it comes into contact with the faces of said slats; but owing to the inclination of said slats the air is slightly thrown off from the front faces and consequently hugs against and travels in contact with the rear faces of the slats, the term "rear faces" being used with reference to the direction of travel of the cylinder.

In practice it is found that the fine dust, which is very adhesive, deposits itself upon the rear faces of the blades, slats, or flights on the descending side of the drum, the deposit being comparatively small at the outer edges, but increasing toward the inner edges of the slats, and being greatest at the point where the inner edge of one slat overlaps or projects beyond the corresponding edge of the next slat. The material thus deposited upon the blades adheres thereto and is carried by them to a point on the ascending side of the drum beyond the vertical plane of the upper edge of gather-board *i*.

Gravity assists in holding the material to or upon the rear faces on the descending side of the drum and for a certain distance upward on the ascending side; but about the time that the blades pass a radial plane extending from the axis of shaft E to the upper edge of the gather-board *i*, gravity begins to act in the opposite way or to cause the descent of the material, and it is discharged from the backs of the blades, the outward movement of the air effected by the inclination of the blades causing the material to be thrown toward the slatted rack G and over the conveyer-trough F′, into which it settles, the light particles being precipitated in agglomerated masses and unaffected to any considerable extent by the air-current. Thus it will be seen that on the descending side gravity, adhesion, and to a considerable extent the vortical movement of the air-current, combine to effect a deposit of the finer material, dust, &c., upon the rear faces of the blades, while on the ascending side of the drum centrifugal action and gravity combine to free and discharge the material, which is at that point freed from air-pressure or subjected only to light pressure.

The inclination of the blades is a matter of great importance, and while, as above indi-

cated, it may vary within certain limits, I deem it advisable to keep within an inclination of from thirty to forty degrees, although I do not restrict myself arbitrarily to these limits. Measurably good results may be attained within considerably wider limits; but practical experience has demonstrated, at least to my satisfaction, that an angle of thirty-five degrees to the radial is conducive to the best results.

It will, of course, be understood that the frame-work may be of any usual or suitable description; that materials may vary; that the particular mode of driving the cylinder is unimportant, and that the proportions of the parts may also be changed, as circumstances and the nature of the material to be operated upon may require, the proportions and relative arrangement indicated in the drawings being such as are deemed best for the collection of flour dust. So, too, the annular heads *a* of the cylinder C may be connected by stay rods or braces or simply carried by the spiders, as indicated in the drawings. These matters of minor detail belong to the province of the mechanic rather than constituting any part or feature of the invention.

The tubular guards G of my former patent may be employed, if desired, though I have found them unnecessary in practice.

In practice I shall give to the cylinder C a circumferential speed approximately the same as that of the air-current as it enters the chamber A, in consequence of which the tendency to produce a strong outward pressure of the air and to prevent its passage inward to the escape-openings is largely neutralized and the air is enabled to travel to the outlets without undue back-pressure.

It is particularly to be noted that in the present machine the blades are thin and flat, their front and rear faces being parallel with each other. Some deviation from true parallelism may be permissible; but it is important to avoid any considerable deviation, the angle of each blade and of each face of the blade contributing materially to the attainment of the result in view and any great departure therefrom interfering with such result.

Having thus described my invention, what I claim is—

1. In a dust-collector, the combination of a shell or casing provided with an inlet for dust-laden air and a rotatable drum or cylinder mounted within said casing and having its exterior directly exposed to the incoming air, said drum consisting, essentially, of blades or flights having their front and rear faces inclined at an angle of approximately thirty to forty degrees from lines radiating from the axis of the drum or cylinder.

2. In a dust-collector, the combination of a shell or casing provided with an inlet at one side and a rotatable drum or cylinder located within and eccentrically to said shell or casing, said drum consisting, essentially, of a series of slats, blades, or flights inclined at an angle of approximately thirty to forty degrees from lines radial to the axis of the drum.

3. The herein-described dust-collector, consisting of shell or casing A, provided with openings *e* in its ends, rotatable drum or cylinder C, consisting, essentially, of overlapping inclined blades *b*, slatted rack G, trough F, and conveyer H.

4. In combination with shell or casing A, provided with inlet B, drum or cylinder C, mounted eccentrically within the casing and consisting, essentially, of overlapping slats or flights *b*, inclined at an angle of approximately thirty to forty degrees from lines radial to the axis of the cylinder.

5. In combination with a shell or casing A, provided with inlet B, drum or cylinder C, mounted eccentrically within the casing and provided with slats or flights *b*, inclined approximately at an angle of from thirty to forty degrees to lines radial to the axis of the cylinder.

6. In combination with shell or casing A, provided with an air-inlet, drum or cylinder C and slatted rack G, the slats of which are of a length less than that of the chamber A.

7. In a dust-collector, the combination of a shell or casing provided with an inlet, and a rotatable drum located within said shell or casing and consisting, essentially, of overlapping blades arranged oblique to lines projected radially from the axis of the cylinder.

8. In combination with a shell or casing, a rotatable drum or cylinder C, mounted therein and provided with sheet-metal blades bent or creased longitudinally, substantially as and for the purpose set forth.

9. In a dust-collector, the combination of a shell or casing provided with an opening in its end wall and a drum or cylinder mounted within said casing and having an opening registering with the opening in the casing and comprising heads and a series of overlapping blades or flights arranged at angles to lines radiating from the axis of the cylinder.

In witness whereof I hereunto set my hand in the presence of two witnesses.

WILLIAM A. COCKRELL.

Witnesses:
ALBERT EMANUEL,
EDWARD F. LIPP.