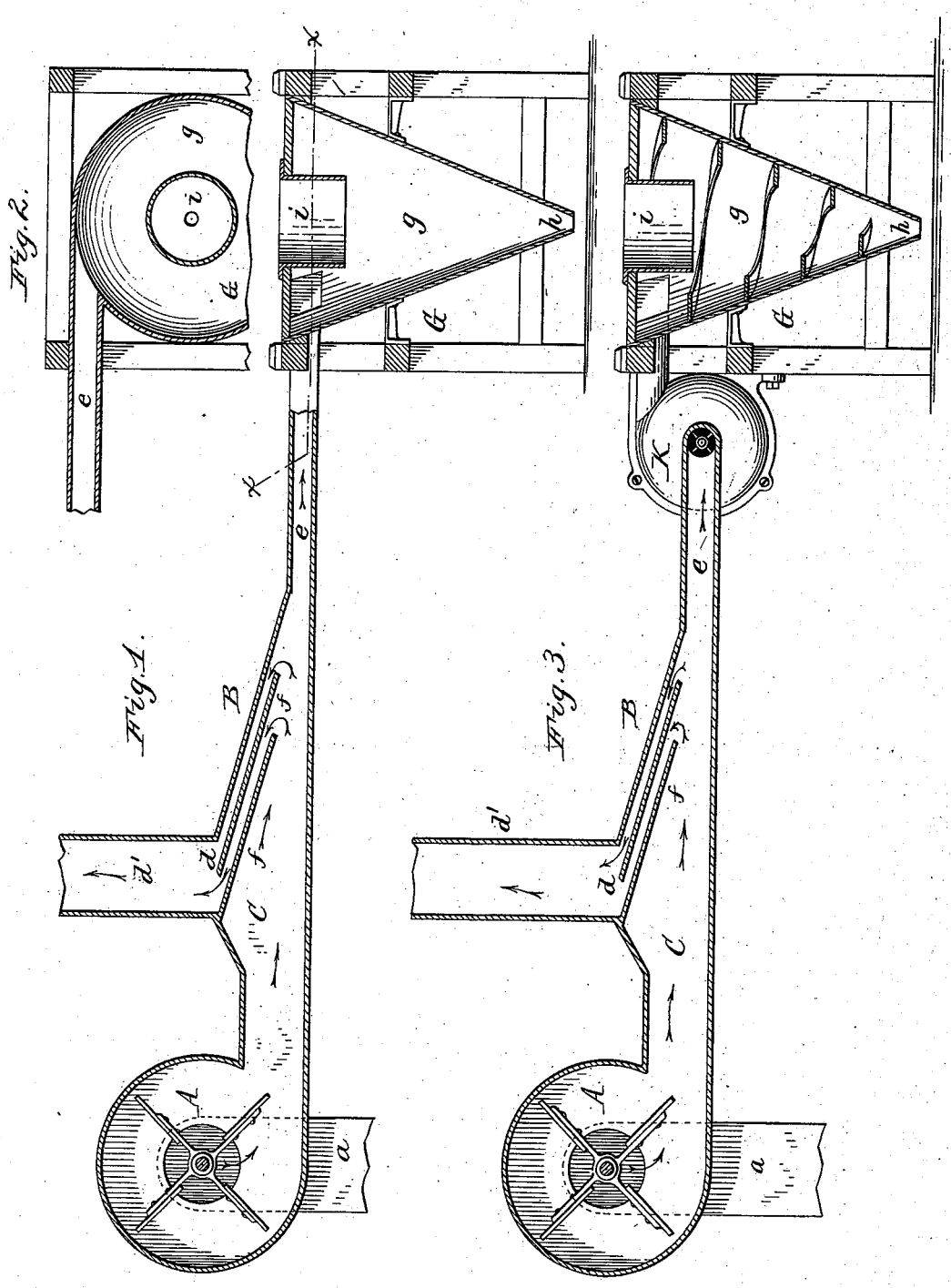
(No Model.)

C. R. KNICKERBOCKER.

DUST COLLECTOR.

No. 382,614. Patented May 8, 1888.



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UNITED STATES PATENT OFFICE.

CHARLES R. KNICKERBOCKER, OF JACKSON, MICHIGAN, ASSIGNOR TO THE KNICKERBOCKER COMPANY, OF SAME PLACE.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 382,614, dated May 8, 1888.

Application filed March 1, 1888. Serial No. 265,848. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. KNICKERBOCKER, of Jackson, in the county of Jackson and State of Michigan, have invented new and useful Improvements in Dust-Collectors, of which the following is a specification.

This invention relates to that class of dust-collectors which are employed in flouring-mills, grain-elevators or store-houses, wood-working establishments, and in various other factories for separating flour-dust, chaff, straw, sawdust, shavings, and other solid matter from the air in which this matter is suspended. In all of these machines the object is to discharge the solid matter from the dust-collector mingled with as little air as possible, while the air from which the solid matter has been separated is permitted to escape in a different direction.

The object of this invention is to obtain a close separation of the dust from the air by smaller machines than heretofore employed, thereby avoiding the necessity heretofore existing of constructing large unwieldy machines, which are difficult to ship and locate when the volume of dust-laden air delivered to the machine is considerable—as, for instance, when one dust-collector receives the air from a number of grain-separators or other machines.

My invention consists, to that end, in combining a preliminary dust-collector, in which a portion of the air is separated from the dust, with a subsequent dust-collector which is connected with the dust-discharge of the preliminary dust-collector, and which effects a further separation of the air from the dust, as will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional elevation of a simple form of my improved dust-collector. Fig. 2 is a horizontal section in line *x x*, Fig. 1. Fig. 3 is a similar view showing an auxiliary fan interposed between the preliminary and subsequent dust-collectors.

Like letters of reference refer to like parts in the several figures.

A represents a fan, which receives the dust-laden air through the induction-spout *a*, and delivers the same to the preliminary dust-collector B, which is connected with the blast-spout of the fan A. This preliminary dust-collector is preferably composed of a tube, C, having in its top an air-escape opening, *d*, at its end a contracted dust-discharge, *e*, and deflecting plates *f f* extending into the tube toward its discharge end, as more fully described in Letters Patent of the United States, No. 375,983, dated January 3, 1888. This preliminary dust-collector effects a separation of part of the air from the dust or solid matter, the latter being concentrated into an air-current of smaller volume passing through the discharge-conduit *e*, while the separated air escapes through the escape-opening *d*, which may be surmounted by a pipe, *d'*, as shown.

G represents the subsequent dust-collector, which is connected with the dust-discharge conduit *e* of the preliminary dust-collector, and receives the dust-laden air-current therefrom. This subsequent dust-collector is preferably of the type in which centrifugal force is employed in effecting the separation.

As represented in Figs. 1 and 2, the dust-discharge conduit *e* of the preliminary dust-collector enters the conical separating-chamber *g* of the subsequent dust-collector tangentially, whereby the dust-laden air is caused to assume a whirling motion in this separating-chamber. This subsequent dust-collector effects a further separation of the air from the dust, the latter being discharged through the opening *h* at the small end of the conical separating-chamber, while the air is discharged through the opening *i* at the large end of the separating-chamber. As this type of machine is very effective in making a close separation of the dust from the air, I prefer to use it for the subsequent separation.

When the preliminary dust-collector is located at a considerable distance from the subsequent dust-collector, or when a single subsequent dust-collector is combined with several preliminary dust-collectors, an auxiliary fan, K, is preferably arranged in the dust-conduit leading to the subsequent dust-collector, as represented in Fig. 3. This fan accelerates the movement of the concentrated dust from the preliminary dust-collector to the subsequent dust-collector and insures the proper

working of the subsequent dust-collector, while it at the same time improves the operation of the preliminary dust-collector by reducing the back pressure to a minimum.

In fitting up a grain store-house, mill, or other establishment each grain-separator, or other machine in which an air-separation is effected, may be provided with a separate preliminary dust collector, and the dust-discharge conduits of the same may be united so as to discharge into a single subsequent dust-collector, which extracts from the concentrated dust-laden air-current the remainder of the separable volume of air and discharges the solid matter into a convenient receptacle—for instance, into the boiler-room, where it is used as fuel. Each of these dust-collectors can be of comparatively small size, so that they can be conveniently shipped and put in place for operation.

I prefer, for the preliminary separation, a dust-collector in which the separation of the dust from the air is effected by deflection and projection, and for the subsequent separation a dust-collector in which centrifugal force is employed; but I do not wish to limit myself to this order of arrangement.

Two or more preliminary dust-collectors, in which the separation of the dust from the air is effected by deflection and projection, might be employed, in which a certain percentage of the air would be separated from the dust in its passage from one dust-collector to the other, and the same type of dust-collector might be used in effecting the subsequent or final separation.

When the solid matter which is delivered into the tapering separating-chamber of the subsequent dust-collector is so heavy or bulky that centrifugal force prevents it from going down to the dust-discharge opening—as, for instance, blocks, shavings, &c.—this separating-chamber is provided on its inner side with a spiral flange, as represented in Fig. 3, or is otherwise constructed to compel the solid matter to pass to the dust-discharge opening.

By combining the two successive dust-collectors in the manner herein claimed—that is to say, so that the dust-exit of the preliminary dust-collector discharges into the inlet-spout of the subsequent dust-collector—a large portion of the air is removed by the preliminary dust-collector, and the volume of air which reaches the subsequent dust-collector with the dust is greatly reduced, thereby enabling the final separation of the dust from the air to be effected closely without creating an objectionable back pressure. By this means the volume of air is reduced before the final separation is effected, while in the constructions heretofore used the volume of dust or solid matter was gradually reduced.

I do not claim as my invention the construction of either the preliminary or the subsequent dust-collector herein described and shown, both of these machines having been well known prior to my invention.

I claim as my invention—

1. The combination, with a preliminary separating-chamber provided with an inlet for the dust-laden air, an exit for the separated air, and an exit for the reduced volume of air containing the dust, of a subsequent separating-chamber having its inlet connected with the exit through which the reduced volume of air containing the dust issues from the preliminary chamber, and provided with an exit for the separated air and an exit for the dust, substantially as set forth.

2. The combination, with a preliminary separating-chamber provided with an inlet for the dust-laden air, an exit for the separated air, and an exit for the reduced volume of air containing the dust, of a subsequent separating-chamber having an exit for the separated air and an exit for the dust, a conduit connecting the exit of the preliminary separating-chamber for the reduced volume of air containing the dust with the inlet of the subsequent separating-chamber, and a fan arranged in said conduit, substantially as set forth.

3. The combination, with a preliminary dust-separating chamber provided with an inlet for the dust-laden air, an exit for the separated air, and an exit for the reduced volume of air containing the dust, of a circular subsequent separating-chamber having an exit for the separated air, an exit for the dust, and a tangential inlet-spout connected with the exit through which the reduced volume of air containing the dust issues from the preliminary separating-chamber, substantially as set forth.

Witness my hand this 27th day of February, 1888.

CHARLES R. KNICKERBOCKER.

Witnesses:
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