J. & G. RICHARDS.

Apparatus for Collecting and Transporting Grain and other Material.

No. 143,254. Patented September 30, 1873.

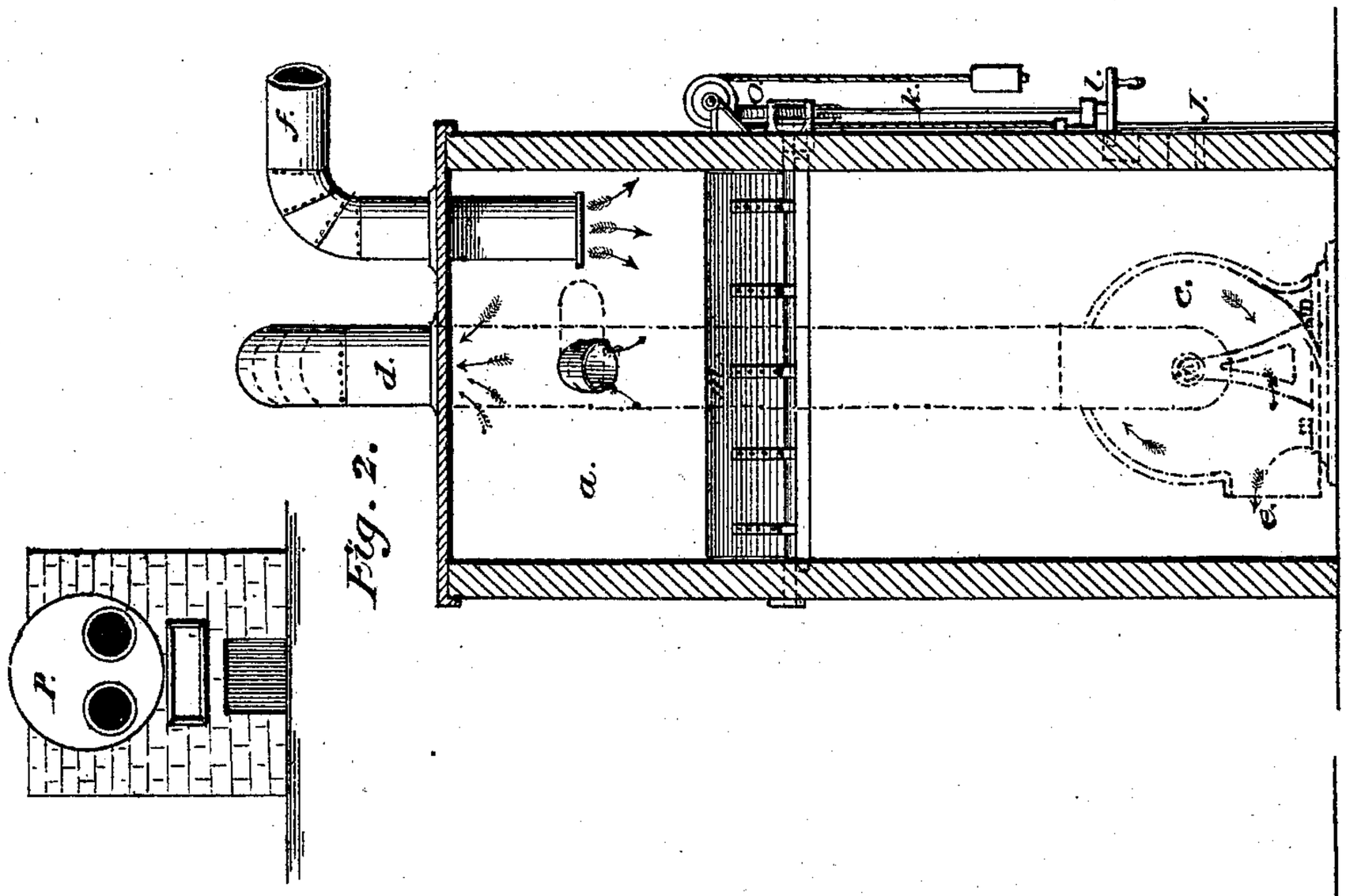

Fig. 2.

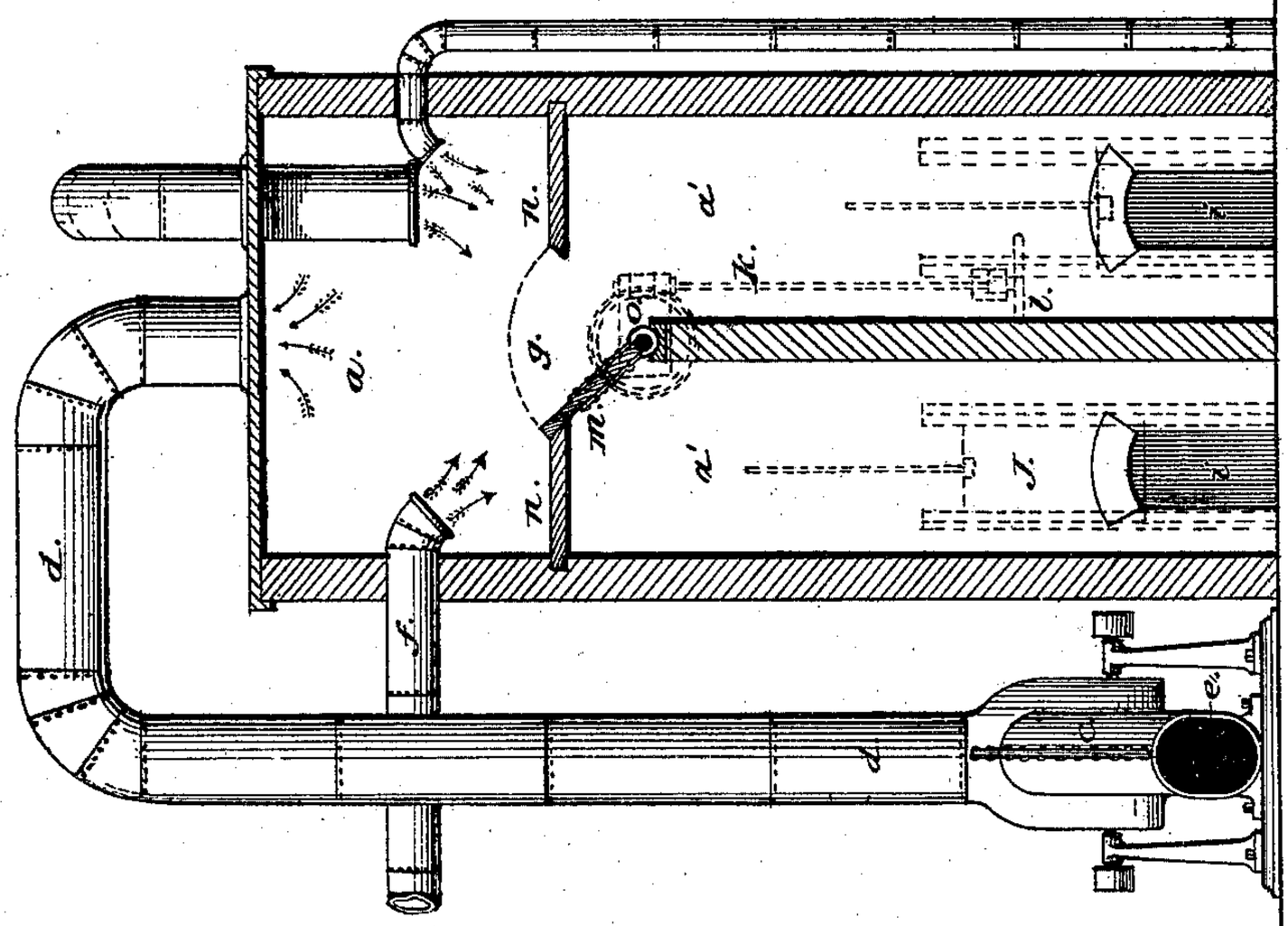

Fig. 1.

Attest;

Clarence S. Bement

Wm. H. Crombell

Inventor.

John Richards

George Richards

UNITED STATES PATENT OFFICE.

JOHN RICHARDS AND GEORGE RICHARDS, OF PHILADELPHIA, PA.

IMPROVEMENT IN APPARATUS FOR COLLECTING AND TRANSPORTING GRAIN AND OTHER MATERIALS.

Specification forming part of Letters Patent No. **143,254**, dated September 30, 1873; application filed February 25, 1873.

To all whom it may concern:

Be it known that we, JOHN RICHARDS and GEORGE RICHARDS, both of the city and county of Philadelphia and State of Pennsylvania, have invented certain Improvements in pneumatic apparatus for collecting and removing dust and shavings or transporting grain or other material, of which the following is a specification:

This invention relates to devices for collecting and removing dust, shavings, or other debris created by manufacturing processes, and for transporting any kind of material to which it may be applicable by means of currents of air induced by fans or other pneumatic apparatus in such manner that the substances being conveyed will not pass through nor injure the acting machinery, and so that the substances or material will not be injured by the action of the machinery. It consists in fans or other pneumatic apparatus for inducing currents of air, in combination with pipes for conducting and a magazine for collecting such substances or material, arranged and operating as hereinafter described and explained by the drawings. The air-currents may be created and maintained by any of the well-known machinery that is directed to the purpose in other cases. Various modifications of centrifugal fans, or what are termed positive blowers, may be used and the same result attained, so long as the air-currents are sufficiently strong to carry the material being conveyed. The use of the pneumatic currents to convey dust, shavings, and other substances is well known, and extensively applied; but in such apparatus as hitherto constructed and arranged the substances being conveyed have been passed through the fans or other machines used to generate the air-currents, thereby causing accident to the machinery and rendering such pneumatic apparatus applicable only in cases where the machinery would not be injured by the substances so conveyed, and to substances not liable to injury from the action of the machinery. The object of this invention is to obviate these difficulties by the devices hereinafter described and set forth in the drawings.

Figure 1 is an elevation, partially in section, of a collecting-magazine, pneumatic fan, and pipes arranged to embody our invention. Fig. 2 is a transverse vertical section through Fig. 1.

a is a magazine or receptacle for dust or shavings with its walls shown in section. *f f f* are induction-pipes, through which the dust, shavings, or debris passes from the machines or place of collection to the magazine. *c* is a pneumatic fan of the ordinary construction, connected with the top of the magazine by the pipe *d*. *e* is the outlet, through which the air is expelled after passing through the fan. *g* is an air lock or valve for opening or closing the connection between the top of the magazine *a* and the two chambers *a' a'* formed by the division-wall *h*. *i i* are doors for removing the substances from the magazine, closed by the sliding plates *j*, which are counterweighted, as seen in Fig. 2. *m* is a valve pivoted on the top of the division-wall *h*, so as to swing both ways and close either of the chambers *a'* by coming in contact with the shelves *n n*. This valve *m* is operated by a tangent-wheel at *o*, the vertical shaft *k*, and hand-wheel *l*. *p* is a steam-furnace to show the general arrangement when the dust, shavings, or other debris are to be burned for fuel. The arrows indicate the course of the air-currents.

The operation of the apparatus can be described as follows: The fan *c* being set in motion it exhausts the air from the chamber *a*, inducing a partial vacuum. The air rushes in through the pipes *f f f* to supply this vacuum with a force equal to the effect produced by the fan, the air carrying with it dust, shavings, debris, grain, or other substances intended to be conveyed. These pipes *f f f* extend to various machines or places where the material is to be first collected, and can be of such diameter and number as the nature of the duty may require. Their aggregate area should, however, not exceed that of the pipe *d*. The dust, shavings, debris, or other substance, when discharged into the chamber *a*, falls down into one of the chambers *a'* as the swing-valve at *g* may determine, the up current of the pipe *d* not being strong enough to lift any but the finest dust, which it is gener-

ally desired to have carried off. By closing the air-lock at *g*, by swinging the valve into the right or left, one of the chambers *a'* is in connection with the top-chamber *a*, while the other being disconnected the discharging-door at *i* can be opened to remove the contents without interfering with the partial vacuum in the other chamber *a'* and the top-chamber *a*. By reversing the valve *m* from one side to the other as the chambers *a'* are filled, the contents can be removed alternately from each without disturbing the air-currents in the pipes *f f f*. The area of the top chamber *a* being much larger than the aggregate area of the several pipes the up draft of air-current to the pipe *d* is in the same ratio, and as before stated, not strong enough to carry off any but fine dust.

The air-lock and double-chamber magazines, as here arranged, are adapted to grain wood shavings, saw-dust, or the debris from the manufacture of hemp or other textile substances, but it will be evident that various modifications will be needed to meet the conditions of different cases.

For conducting cotton, wool, hemp, flax, or other fibrous substances of great bulk, the size of the magazine will be much larger than for material that is more ponderable, such as match-splints, pins, folded paper, or other things of less bulk and more weight than fibrous material.

In some cases the magazines for collecting can with advantage be constructed of iron plates, and the air-lock consists in diaphragms arranged with valves in the manner employed in engineers' caissons, the principle and operation of the apparatus as a whole remaining the same. The air and dust drawn off from the magazine *a* and expelled from the fan at *e* can be conducted to a steam-chimney, and not only assist the draft, but by this means get rid of the dust which is with pneumatic apparatus as hitherto arranged a serious difficulty.

In the use of this pneumatic apparatus for conveying or lifting grain in elevators or mills or from vessels and railway-cars, the grain can be collected by means of flexible tubes capable of being moved from place to place and directed by the hands of an attendant.

We claim—

1. The pneumatic apparatus for transporting grain, shavings, dust, textile material, or other substances, arranged and operating as described, consisting essentially of a magazine in which a partial vacuum is maintained, a fan or equivalent to generate air-currents, with conducting and air pipes, the whole combined and operating substantially as specified.

2. A magazine or receptacle for the substances being conveyed arranged with chambers and capable of being partially exhausted of air, as hereinbefore described.

3. A magazine constructed with an air-lock and compartments that may alternately be emptied without impairing the air-currents in the feeding-pipes, as shown and described.

JOHN RICHARDS.
GEORGE RICHARDS.

Attest:
CLARENCE S. BEMENT,
WM. H. CROMWELL.