(No Model.) 2 Sheets—Sheet 1.

L. O. STEVENS.

COMBINED PNEUMATIC ELEVATOR AND GRAIN SEPARATOR.

No. 247,277. Patented Sept. 20, 1881.

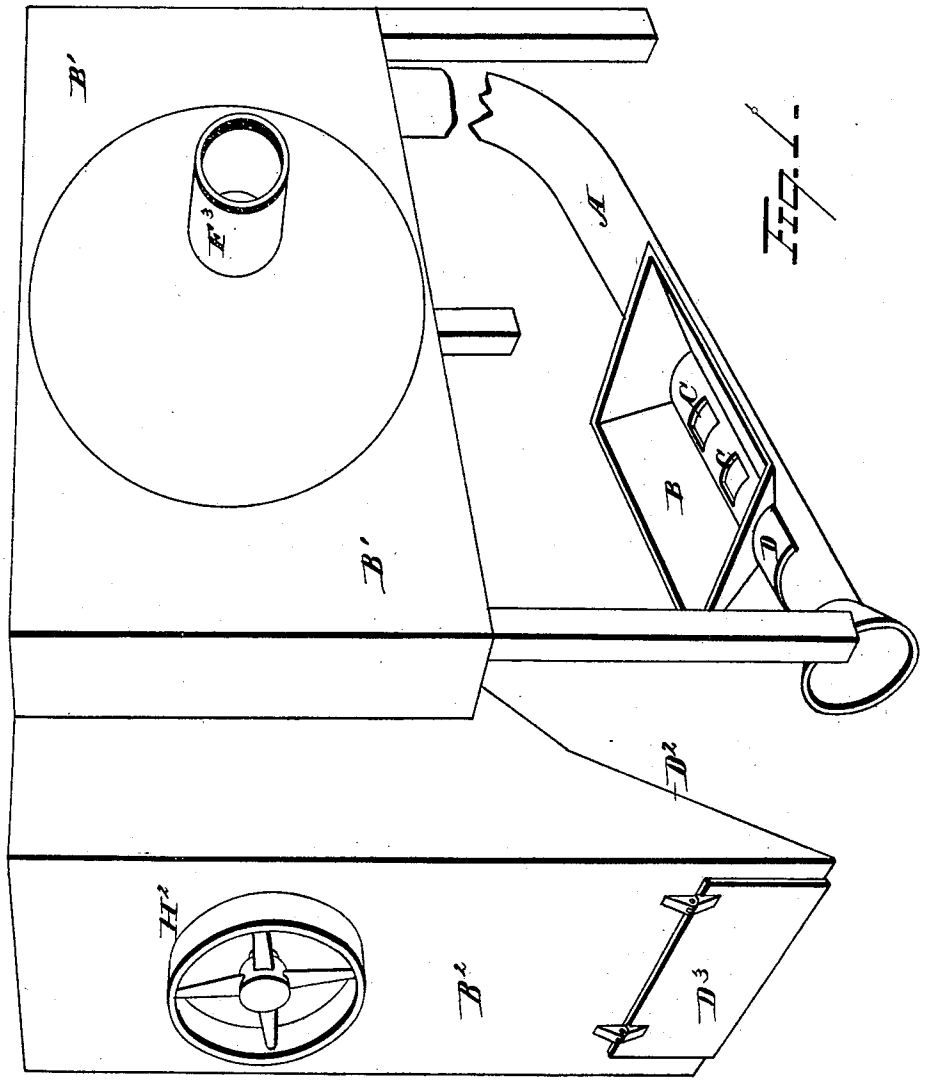


Fig. 1.

WITNESSES

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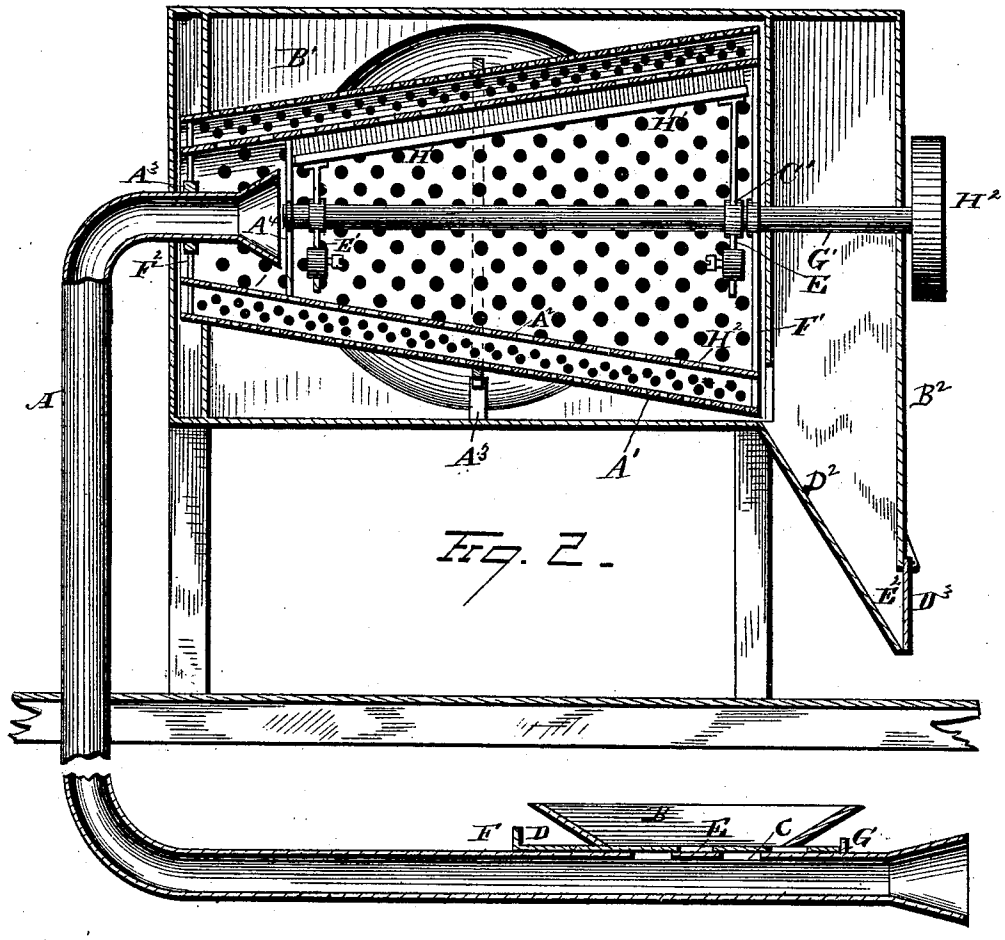


Fig. 2.

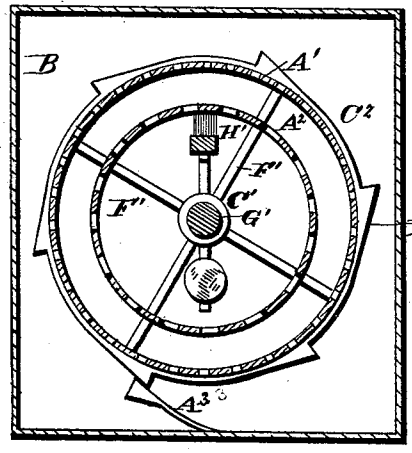


Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

LUCIOUS O. STEVENS, OF BURLINGTON, IOWA, ASSIGNOR OF ONE-HALF TO GEORGE H. LANE, OF SAME PLACE.

COMBINED PNEUMATIC ELEVATOR AND GRAIN-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 247,277, dated September 20, 1881.

Application filed March 26, 1881. (No model.)

To all whom it may concern:

Be it known that I, L. O. STEVENS, of Burlington, in the county of Des Moines and State of Iowa, have invented certain new and useful Improvements in Combined Pneumatic Elevators and Grain-Separators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to an improvement in pneumatic elevators and conveyers, the object being to provide a device of this character which shall be adapted to fill the threefold function of conveying, elevating, and purifying grain.

With these ends in view my invention consists in certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompany drawings, Figure 1 is a perspective view of a pneumatic elevator, conveyer, and cleaning apparatus constructed in accordance with my invention. Fig. 2 is a view thereof in vertical longitudinal section, and Fig. 3 is a view in vertical cross-section.

A represents a conveying or elevating tube, through which the grain is passed in its passage from a lower to a higher plane, or to a distant point. The said tube may be constructed of any suitable size and material and of any desired length, all of these conditions depending to a great extent upon the character of the grain to be elevated or conveyed, the rapidity with which the elevation or transmission is to be accomplished, the power of the air-pressure, and the difference in the height of the two planes—namely, the one in which the grain is situated and that to which it is to be raised—or the distance horizontally from the point where the grain is situated to the point to which it is desired to transport it. A hopper, B, is located over and in connection with the said tube A at or near its lower end. That portion of the upper face of the tube A which forms the bottom of the hopper B is perforated with apertures C, through which the grain falls into the tube A. Regulator or slide D, perforated at E, and provided with an operating-handle, F, is adapted by its segmental form to fit the top of the tube A and govern the flow of grain from the hopper into the tube, whether it be to the full capacity thereof or not. A lug, G, prevents the slide from being carried too far forward. The upper end of the tube A is received in the smaller end of the inner of two rotary perforated cones, A' A^2, located one within the other and revolving in a vacuum-chamber, B', from which the air is exhausted by suitable means through a pipe opening thereinto. These cones are supported to revolve within the said vacuum-chamber by a shaft, G', longitudinally traversing the center of the inner cone, A^2.

To the outer edges of the large ends of the two cones are secured two bars or rods, F', which cross each other at right angles at the center of the smaller cone A^2. The edges of the smaller ends of the cones are also traversed by similar rods F^2, which are connected to a ring, A^3, encircling and having bearing upon that portion of the elevating-tube A that enters the smaller end of the inner cone.

The inner end of the shaft G' is supported by two rods, A^4 A^4, which intersect each other at right angles at the center of the cone and have their outer ends secured to its inner periphery. The outer end of said shaft is supported at the intersecting point of the bars F' F', before described. Rigid connection is made between the shaft and rods, in order that the cones may partake of the motion imparted to the shaft through pulley H^2, located outside of the chute B^2, and obtained by any suitable and convenient motor.

The outer cone, A', is provided with a great number of small perforations, which are large enough only to allow chaff, small seeds, and broken kernels of grain to pass through them, while the inner cone is provided with perforations large enough to allow the escape of perfect and purified grain, but retain within the cone all foreign matter of a bulkier character—as straw, sticks, &c. The cleaned grain is thus introduced into a chamber formed be-

tween the two cones, from whence it is delivered into the chute.

I do not limit myself to any one material of which to construct the cones, as it is apparent that they may be made of perforated metal, woven wire, or of rods with narrow interstices between them, and yet answer every object of my invention.

The grain falls from the space between the cones into a chute, B^2, the inner wall, D^2, of which is a plane of steep inclination. A door, D^3, hinged to the perpendicular front wall of the chute, hangs over an escape-aperture, E^2, located at the lower end thereof. The operation of this door will be hereinafter described.

Fig. 1 of the drawings shows the front wall of the said chamber to be of conical or dome shape, such a construction being resorted to for the reason that it is the best adapted to resist outside atmospheric pressure. The apex of the said conical or dome-shaped wall is provided with a pipe, F^3, to which are attached any desired or approved devices for creating a vacuum, as a fan-blower or centrifugal ventilator or a suction-pump.

In addition to the power obtained by atmospheric pressure a propulsive power may be used by forcing air into the tube A at any point of its length.

No construction for producing a vacuum in the vacuum-chamber is shown; and I do not wish to limit myself to any particular means for accomplishing that end.

The creation of a vacuum in the vacuum-chamber through devices connecting with the aspirating-tube leading thereinto will operate to raise the grain through the elevating-tube A by the pressure of the atmosphere and empty it into the smaller end of the inner of the two perforate cones.

The work of separating and purifying the grain is performed by the current of air, which is constantly maintained, rushing through the apparatus, and is assisted by the rotary movement of the cones, imparted thereto through the pulley operated by an independent motor.

In separating the grain from impurities such a strong air-current is necessary that the grain, in endeavoring to follow it, will be drawn to the inner peripheral face of the cones, and without some disturbing agency will clog the perforations through which the grain and chaff are to escape. To obviate such clogging I employ a brush, H′, supported to have engagement with the inner periphery of the inner cone throughout its entire length. This brush is supported on bars connected with rings C′ loosely encircling the shaft G′. The brush is maintained in a vertical position by adjustable weights on rods E′, attached to the lower face of the rings C′.

The perforations of the outer of the two cones are kept open by devices exterior to it, consisting in a rapper, A^3, actuated by teeth or lugs B^3, located on a band, C^2, which encircles the cone midway of its length. As the cone revolves the rapper will be raised by the inclined faces of the teeth, and when released therefrom will strike with sufficient force upon the surface of the cylinder to dislodge all foreign articles that clog and obstruct the perforations thereof. By the combined action of the brush and rapper, as described, the perforations of the cones are kept free and the separation of the grain is unimpeded.

Having thus described my invention in detail, I will now proceed to describe its method of operation.

The devices for producing a vacuum are set in motion and the air is exhausted from the vacuum-chamber and the chute. The outside air will now rush through the tube. The grain is admitted through the hopper into the tube A, where it meets the air entering at the lower open end of the tube. The grain is carried through and discharged from the upper end of the tube into the smaller end of the inner perforate cone. As the cones revolve, the grain, chaff, and small seed will escape through the perforations of the inner cone, leaving therein the larger objects of refuse, as stalks, sticks, and straw. The grain, chaff, &c., after leaving the inner cone, will be further separated in the space or chamber intervening between the two cones by the escape of the chaff and small seed through the perforations in the large cone, leaving the cleaned grain in said chamber, from which it will be discharged into the chute. The air is exhausted from the chute, and the pressure of the atmosphere on the pendant-hinged door will keep it closed until the weight of the grain within the chute opens it and allows the grain to escape into any receptacle.

My improved pneumatic elevator or conveyer, constructed, as it is, on scientific principles, combines with effectiveness of operation in elevating and cleaning grain, durability in use, simplicity in construction, and ease of management.

I would have it understood that I do not limit myself to the exact construction shown and described, but hold myself at liberty to make such slight changes and alterations as fairly fall within the spirit of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a vacuum-chamber and two revolving perforated cones arranged one within the other and located within the vacuum-chamber, of an elevating pipe or conduit arranged to discharge grain into the smaller end of the inner cone, substantially as set forth.

2. The combination, with a vacuum-chamber, two revolving perforated cones arranged one within the other and located within the vacuum-chamber, and an air-exhaust conduit located opposite the longitudinal centers of the cones, of an elevating pipe or conduit arranged to discharge grain into the smaller end of the cone, substantially as set forth.

3. The combination, with a vacuum-cham-

ber, of two perforated revolving cones arranged one within the other and located within the vacuum-chamber, the perforations of the inner cone being larger than those of the outer cone, and an elevating tube or conduit arranged to discharge grain into the smaller end of the inner cone, substantially as set forth.

4. The combination, with a vacuum-chamber and two cones, one arranged within the other and located within the vacuum-chamber, of an elevating-pipe arranged to discharge grain into one end of the inner cone, and an air-eduction pipe located at the side of the cone, substantially as set forth.

5. The combination, with a perforated cone, of a brush located in contact with the inner surface of the cone, brush-supporting arms sleeved on the cone-shaft, and adjustable weights attached to the ends of the brush-supporting-arms, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of January, 1881.

LUCIOUS O. STEVENS.

Witnesses:
GEORGE H. LANE,
M. J. DELASHMUTT.