No. 618,361. Patented Jan. 24, 1899.

F. F. LANDIS.

PNEUMATIC ELEVATOR AND CONVEYER.

(Application filed Mar. 19, 1898.)

(No Model.)

Fig. 3.

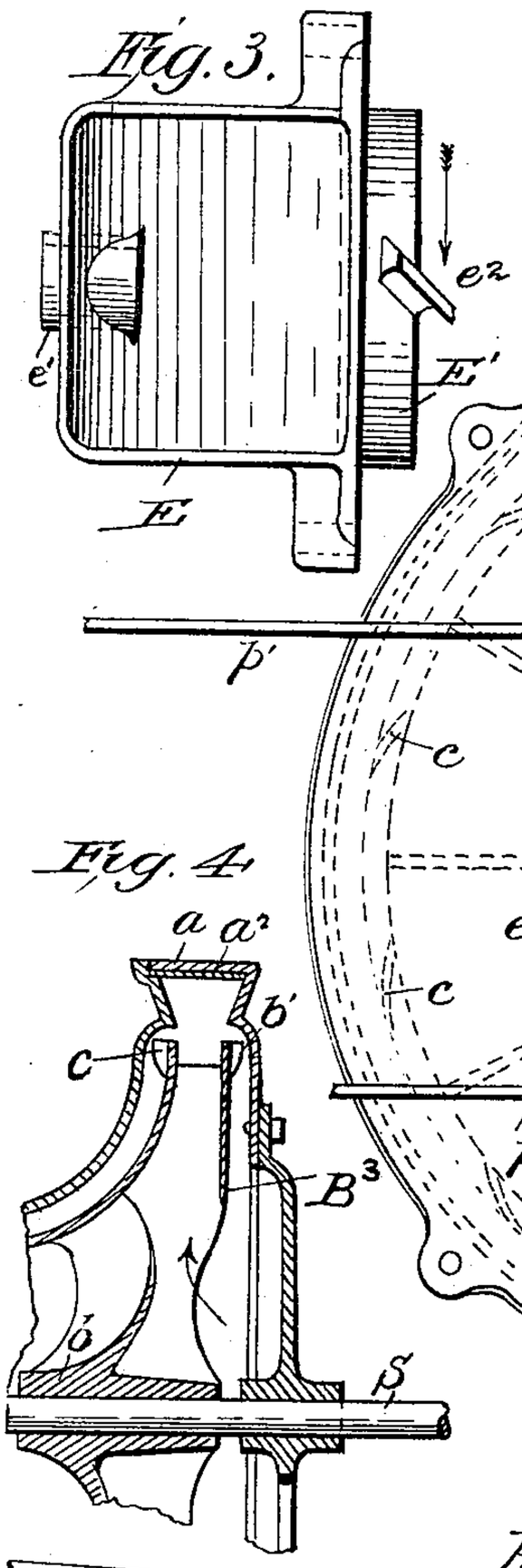


Fig. 1.

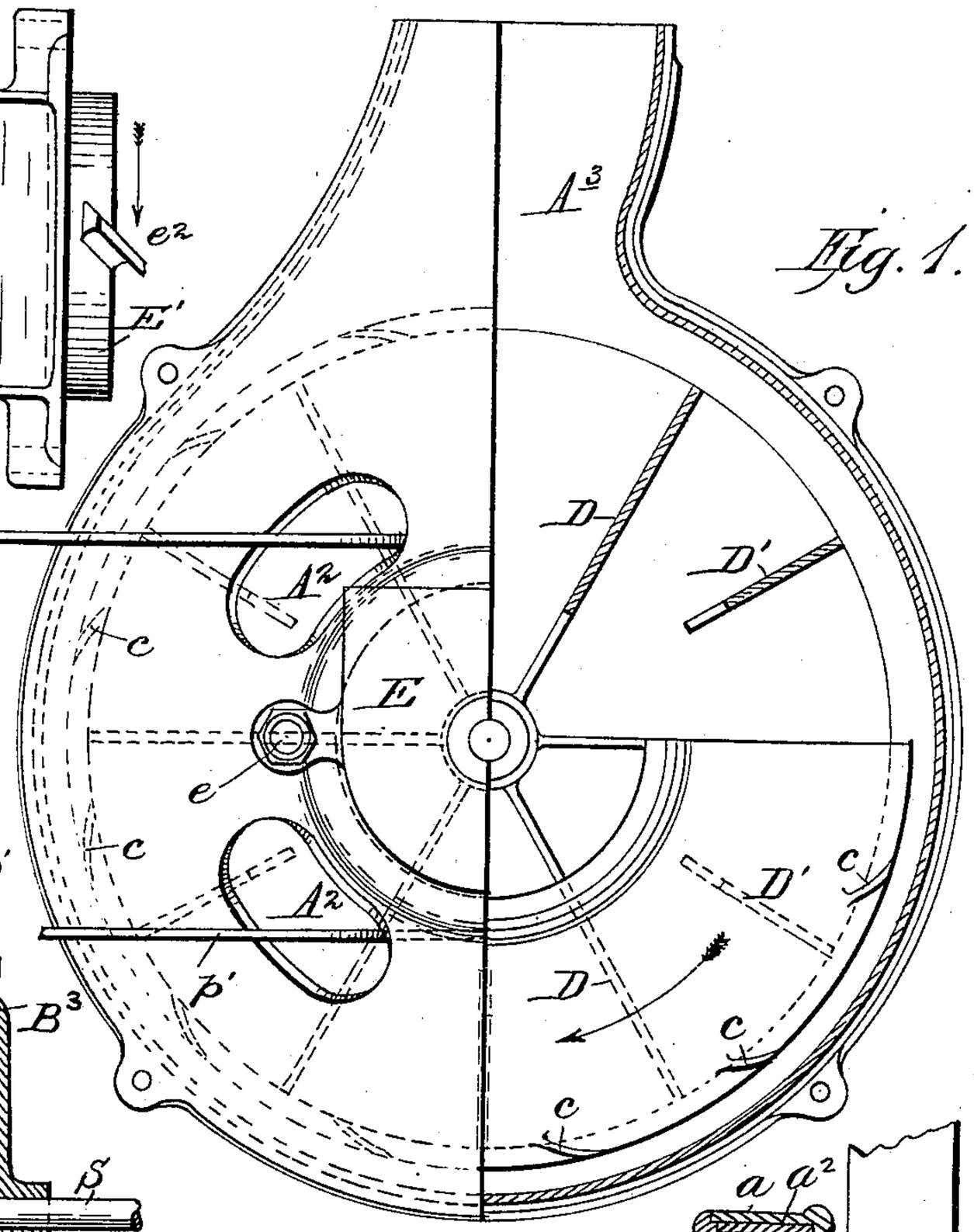
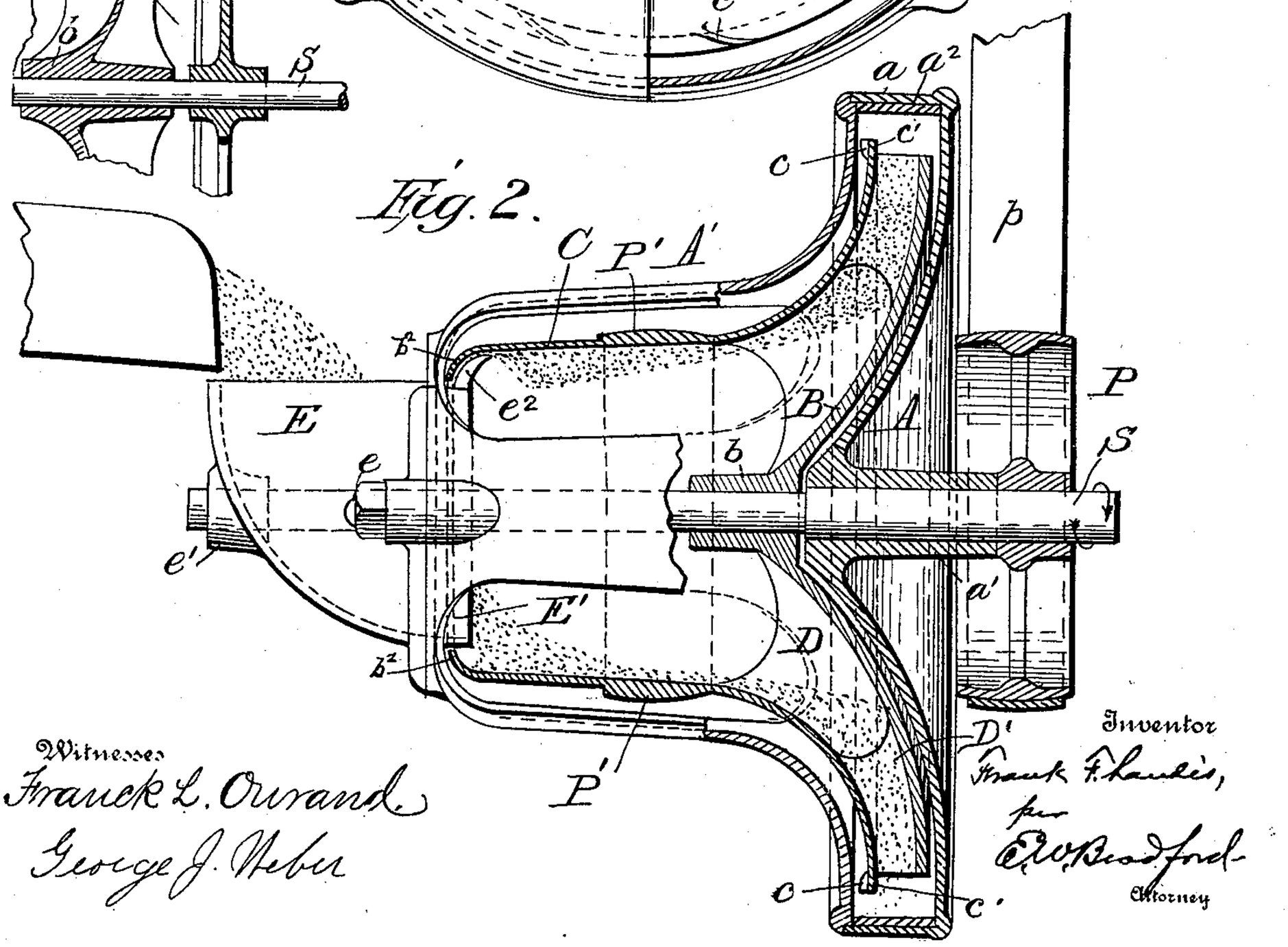


Fig. 4.

Fig. 2.



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FRANK F. LANDIS, OF WAYNESBOROUGH, PENNSYLVANIA.

PNEUMATIC ELEVATOR AND CONVEYER.

SPECIFICATION forming part of Letters Patent No. 618,361, dated January 24, 1899.

Application filed March 19, 1898. Serial No. 674,489. (No model.)

To all whom it may concern:

Be it known that I, FRANK F. LANDIS, a citizen of the United States, residing at Waynesborough, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Pneumatic Elevators and Conveyers, of which the following is a specification.

My said invention consists in an improved form and construction of pneumatic elevating and conveying mechanism for grain and such like substances whereby said seed or other material to be elevated or conveyed is introduced to the blades of a rotary fan while revolving at a sufficient speed to elevate or convey to the desired point without breaking or bruising it; and it also consists in further improvements whereby none of the air or products which have passed through the fan can be returned by vortex currents to its eye again, avoiding the loss of work and obtaining with a given speed of fan a greater speed of the air-current through the discharger or elevating or conveying pipe, and in other improvements in the details of construction whereby the best results are obtained, as will be hereinafter more fully described and claimed.

Referring to the accompanying drawings, which are made a part hereof and on which similar letters of reference indicate similar parts, Figure 1 is a view of the main portion of one of my improved pneumatic elevators, a portion showing the outside casing in elevation, a portion showing the inner casing in elevation, and a portion showing the interior of the fan; Fig. 2, a central longitudinal section through the main portion thereof, the hopper end being shown in elevation; Fig. 3, a top or plan view of the hopper separately; and Fig. 4, a detail view similar to a portion of Fig. 2, showing a modified form.

In said drawings the portions marked A A′ represent the outside casing; B, the inner end of the discharger; C, the outside casing of the discharger; D D′, the fan-blades, and E the hopper.

The casing A A′ consists of the circular plate or disk A, having a transverse rim *a* around its outer edge of the width required for the purpose, and the bell-shaped cylindrical casing A′, bolted at its large end to the edge of said rim and extending to a point a sufficient distance from the plate A to render the device of the length required. At its opposite end it is of a much smaller diameter and has the hopper E rigidly bolted thereto by means of the bolts *e*, which extend through ears formed on the outside of said hopper. In the center of the plate or disk A is formed a journal-bearing *a′* for the shaft S, the opposite end of said shaft being journaled in a bearing *e′* formed on the outer end of the hopper E. Openings A^2 are formed in the casing A′ at intervals around its circumference and extending substantially the length of the horizontal portion.

The end plate or disk B of the discharger proper is formed with a central hub *b* and is mounted rigidly on the shaft S just within and adjacent to the outside disk A. It is preferably somewhat cone-shaped, with the point extending inward, the inward curve being substantially sufficient to make the cross-area between the parts B and C substantially equal from the entrance to the discharge-point, and thus guard against uneven air-pressure therein.

The casing C corresponds in form substantially with the form of the casing A′, being a bell-shaped cylinder, with its small end contracted to a diameter which just encircles a a circular flange E′ on the inner end of the hopper E or the end of any pipe or device arranged to discharge into said elevator. The other end of said casing is of somewhat greater diameter than the disk B, for a purpose which will be presently described, and has distributed at intervals on its outside edge at its periphery small fan-blades *c*.

The fan-blades D connect the disk B and casing C, being fastened securely to each at their opposite edges, and extend to the center or hub of the discharger. The fan-blades D′ are correspondingly secured and are positioned midway between the blades D, but are much shorter in order to leave the central portion of said fan or discharger as much open as possible and prevent crowding at the center.

A pulley P is mounted on the outer end of the shaft S, by which the discharger may be driven from any convenient power through the belt *p*. I have also shown a second pulley P′ formed on the horizontal portion of

the casing C about midway the length of the discharger, and in Fig. 1 I have shown a belt p' passing through two of the openings A^2 in the casing A′ and mounted on said pulley. As will be readily understood, either arrangement for driving the discharger may be employed, as preferred; but I regard the use of the pulley P′ as desirable, inasmuch as it is located between the shaft-bearings with the well-known consequent advantages.

The rim a is preferably lined with non-metallic material a^2—such as rubber, leather, rawhide, or wood—in order that the grain thrown against it may not be bruised. By my construction this lining can be quickly and cheaply renewed by removing the case A and placing a strip of the non-metallic material against the inner surface of the rim a of a little greater width than the space between A A′, which will thus be clamped at its edges between said parts and make an air-tight joint. The discharge-spout A^3 is preferably connected to the casing A A′, so that its sides extend therefrom in substantially a vertical or sharply-inclined direction in order that any of the grain may not find a place to lodge and choke therein.

The operation of my said invention is as follows: The grain or other material to be elevated or conveyed by means of my invention is first introduced into the hopper E from any source of supply, as indicated in Fig. 2, (or for the hopper may be substituted any conductor-pipe attached to the flange E′.) The discharger being in rapid rotation, the material flows from said hopper or pipe to within the horizontal portion of the casing C, which is of slightly-increased diameter next to the discharger proper and is practically smooth on its inner surface, so that the grain is not started revolving by a stroke, but by degrees until centrifugal force causes it to hug the inner surface of said horizontal portion sufficient to create an annular body of grain in said portion. The centrifugal force of the added grain causes that against the surface while revolving to be forced in the direction of the discharger proper, and the grain is received by the discharger while revolving at the speed of the inner ends of the discharger-wings and is accelerated in its centrifugal motion to the full speed of the outer ends of said wings, sliding along the parts without breaking or bruising the material, regardless of the speed at which the discharger is revolving.

On the top of the flange E′ of the hopper E I have shown a deflector e^2, set at an angle, as indicated in Fig. 3, which serves to direct the body of the grain which follows the rotary movement of the casing C and comes in contact therewith in a forward direction toward the discharger-blades and prevents the liability of any of the grain being forced by the added grain over the inward curved rim b^2 at this end of the device and facilitates its movement forward toward the discharger-blades. The bell-shaped casing C is of a diameter somewhat greater than that of the disk B and the fan-blades D D′, as shown. This extended portion c', with the narrow fans c, forms a narrow auxiliary fan of greater peripheral speed and creates a stronger current of air than that of the discharger proper. Said stronger current is forced into the annular space around the periphery of said discharger and prevents in a most perfect manner all leakage or vortex currents of air or products to be elevated by the discharger and maintains the full pressure in the discharge-pipe, due to the speed of said discharger, as none of its work can return between the portions A and C.

It sometimes may happen that the inlet for the material may be overcrowded for the instant and the supply of air be reduced thereby to interfere with the perfect operation of the device. In Fig. 4 I have shown a form of outer casing A, the central portion of which is open, thus affording a rear air-inlet which cannot be crowded, thus obviating the difficulty mentioned. In this form the disk B^3 is made of the same diameter as C, and small fan-blades b' are formed on the outside thereof at its periphery to prevent any back currents or leakage, as do those c on the other side. Such a form may be used in places when the difficulty mentioned is experienced; but I do not regard it as essential.

In elevators of this character, as is well known, it is necessary when elevating to a considerable height that the fan or discharger revolve at a very high speed in order to accomplish the result desired. It has been seen in the use of dischargers of other constructions, where the grain is delivered directly into the discharger between the rapidly-revolving fan-blades, that kernels become bruised and broken and that the value of the machine for the purpose is thus impaired. As will be readily seen from the construction herein shown and described, this disadvantage is entirely obviated, as the grain is introduced onto a practically horizontal revolving and smooth surface and gathers its momentum gradually therefrom, sliding along said surface into the bell-shaped portion to between the discharger-blades, at which point it has the same momentum as said blades, which are thus prevented from bruising or breaking it. This object is further attained by means of the non-metallic lining a^2, against which said grain is thrown when it leaves said discharger-blades.

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

1. A discharger for a pneumatic elevator and conveyer comprising a rotary fan and an outer casing mounted to revolve therewith, which casing is formed with a central horizontally-extending portion constituting the receiver for the material to be operated upon, substantially as set forth.

2. A pneumatic elevator and conveyer comprising an outer casing having a discharge-spout, a rotary casing within having a central horizontal portion outside the fan-blades, said fan-blades, and the driving mechanism, substantially as set forth.

3. A pneumatic elevator and conveyer comprising an outer casing with a discharge-spout, a hopper or pipe attached to the central portion of its open end, a rotary discharger therein consisting of an end disk and a bell-shaped casing connected by transversely-set fan-blades between them, the small end of the outer part being arranged to receive the material, said fan-blades and driving mechanism, substantially as set forth.

4. In a pneumatic elevator and conveyer, the combination of the casing A A′, the part A′ being bell-shaped and having the hopper E connected to its outer end, said hopper formed with a flange extending within said end, the discharger comprising the disk B, bell-shaped casing C and fan-blades connecting them, mounted on a shaft within said outer casing, the outer end of said casing C extending under the flange of said hopper, and driving mechanism, substantially as set forth.

5. The combination in a pneumatic elevator and conveyer, of the outer casing, the rotary discharger within, the rotary casing for said discharger having a central portion extending to receive the material from a feeding device, and a deflector set above the receiving-point at an angle to direct said material toward the discharge end of the apparatus, substantially as set forth.

6. The combination, in a pneumatic elevator and conveyer, of the outer casing, the rotary discharger therein consisting of an end disk and a bell-shaped cylindrical casing connected by fan-blades, said end disk being somewhat cone-shaped with the point inward, whereby the space between said disk and said bell-shaped cylinder is made of substantially uniform area from where the material is introduced to its periphery, and the air-current pressure thereby maintained uniform, and said fan-blades, substantially as set forth.

7. A discharger for a pneumatic elevator and conveyer comprising a rotary cylindrical casing having fan-blades therein, said casing constructed with a substantially uniform area inside from the receiving-point to the discharging-point, and said fan-blades, substantially as set forth.

8. In a pneumatic elevator and conveyer, the combination of the outside casing, the rotary discharger therein comprising an end disk and bell-shaped casing connected by fan-blades, the diameter of said bell-shaped casing at its large end being somewhat greater than that of disk and fan-blades, and said fan-blades, substantially as set forth.

9. In a pneumatic elevator and conveyer, the combination, of the outer casing, the discharger therein formed with its outside edge of greater diameter than its inner edge, and small fan-blades mounted on the outside of said larger side at its periphery, substantially as set forth.

10. The combination in a pneumatic elevator and conveyer, of the outside casing, the rotary discharger therein, consisting of the two parts a distance apart connected by fan-blades, said fan-blades, a portion of which runs to the center, and a portion which does not, whereby the capacity of the fan is maintained and the center thereof not crowded, substantially as set forth.

11. A pneumatic elevator and conveyer comprising an outer casing having a discharger-spout, a rotary casing therein, which incloses the fan-blades and is formed with a substantially horizontal cylindrical portion at its center, outside the fan-blades, which horizontal cylindrical portion revolves therewith and constitutes a receiver into which the material is dropped, which thus may gather rotary momentum gradually therefrom, to the same speed of that of the fan before the fan receives said material and said fan-blades, substantially as set forth.

12. A pneumatic elevator and conveyer comprising an outer casing with a discharger-spout, a rotary discharger therein, having a substantially horizontal and cylindrical portion around its center, outside the fan-blades, which horizontal cylindrical portion receives the material, whereby centrifugal motion is imparted gradually thereto before entering the fan or coming into contact with the blades and said fan-blades, substantially as set forth.

13. In a pneumatic elevator and conveyer, the combination of the outer casing, a discharger therein having two sets of wings, the one set being out of the path or plane of the other and of less width, but larger in diameter than the other, substantially as and for the purpose set forth.

14. In a pneumatic elevator and conveyer, a rotary discharger the casing of which is formed with a central horizontally-extending portion, on which extending portion is formed a pulley to receive the driving-belt for the discharger, substantially as set forth.

15. In a pneumatic elevator and conveyer, the combination, of an outer casing, and a discharger therein having several sets of wings in different planes, the center set being inclosed within said discharger and of less diameter than said casing and wider than the outside wings, and said wings, substantially as set forth.

In witness whereof I have hereunto set my hand and seal, at Waynesborough, Pennsylvania, this 12th day of March, A. D. 1898.

FRANK F. LANDIS. [L. S.]

Witnesses:
T. S. CUNNINGHAM,
ALEX. ENGLE.