(No Model.) 2 Sheets—Sheet 1.

F. F. LANDIS.

FAN FOR PNEUMATIC STACKERS.

No. 568,315. Patented Sept. 22, 1896.

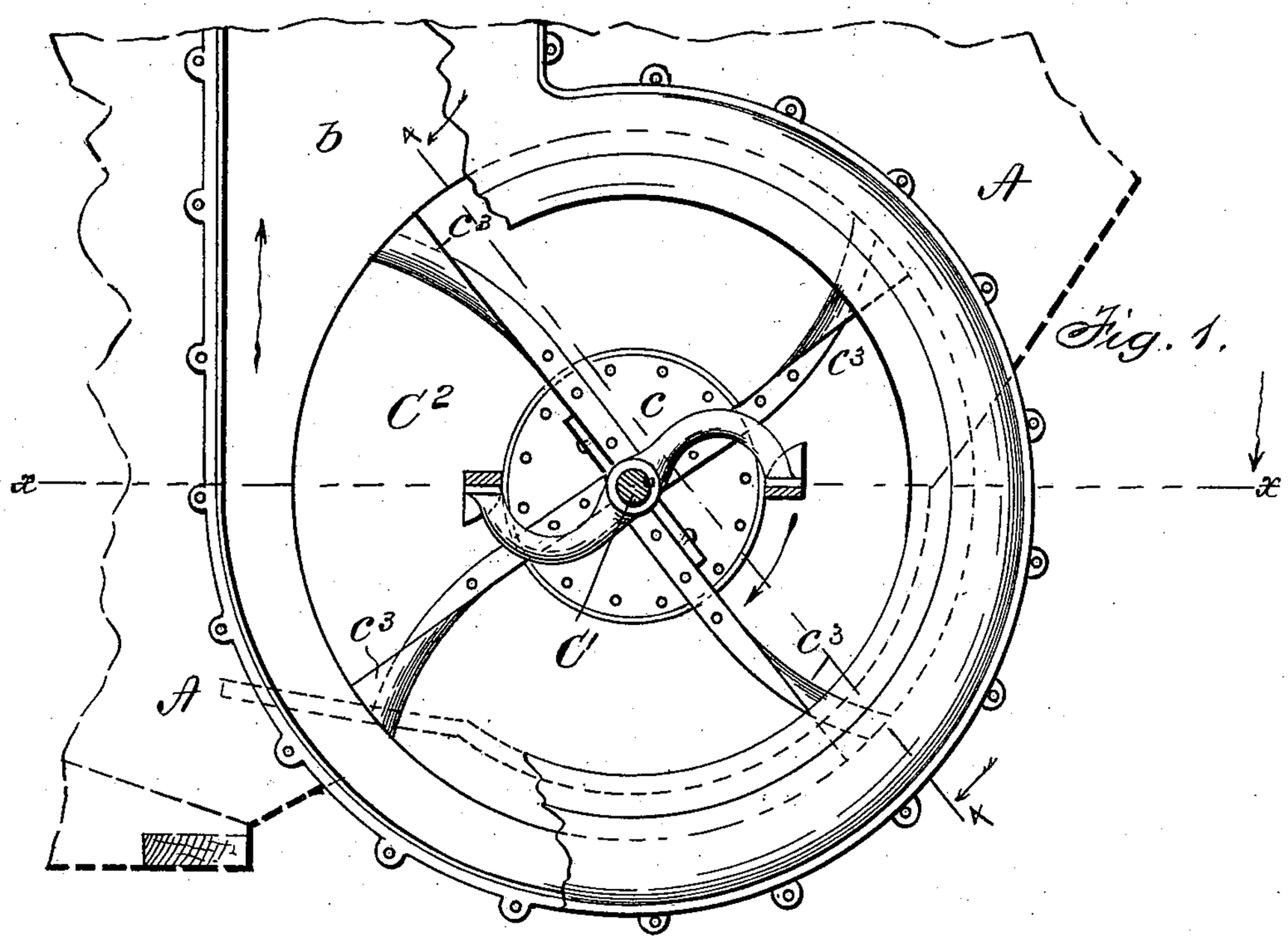

Fig. 1.

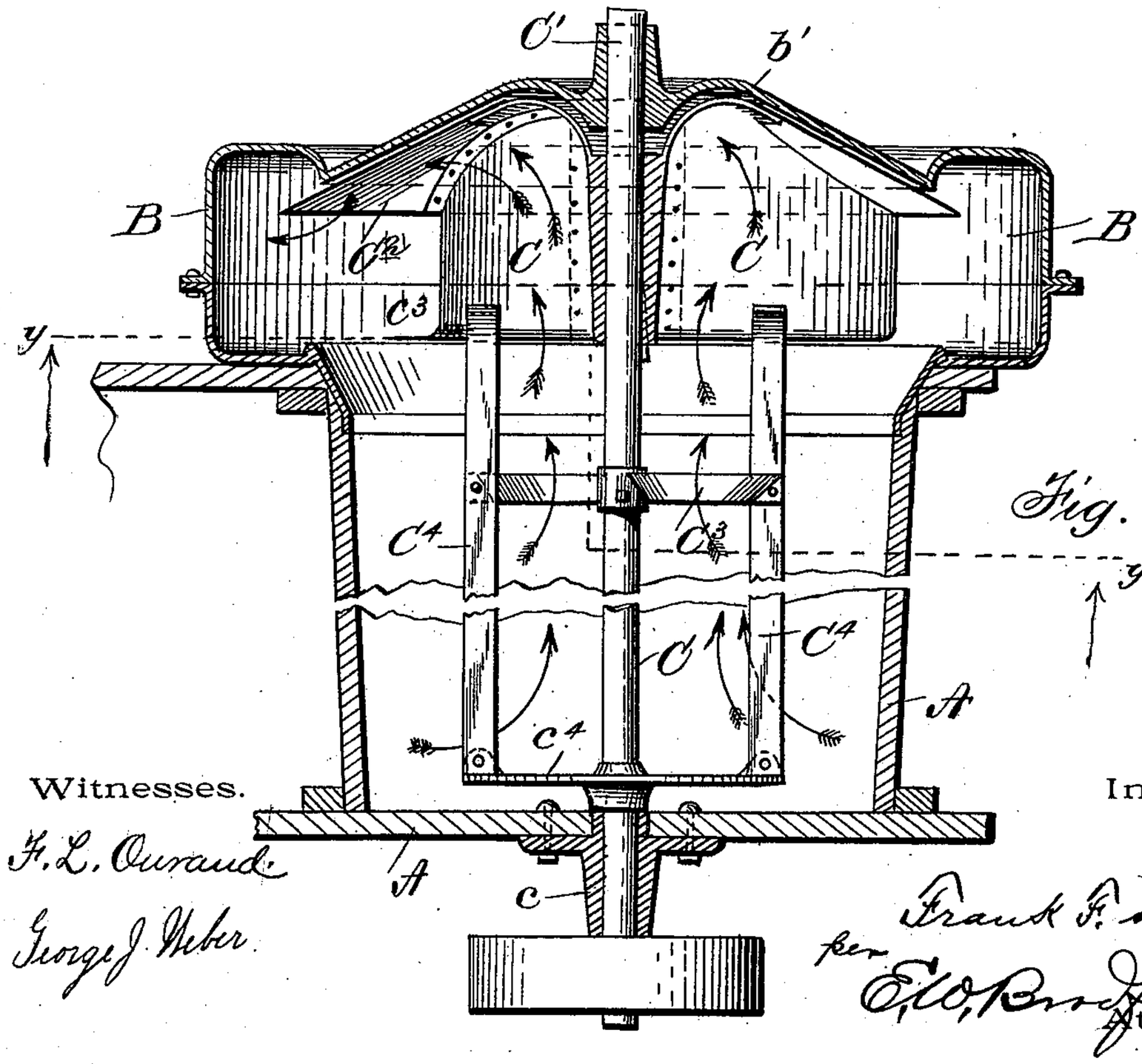

Fig. 2.

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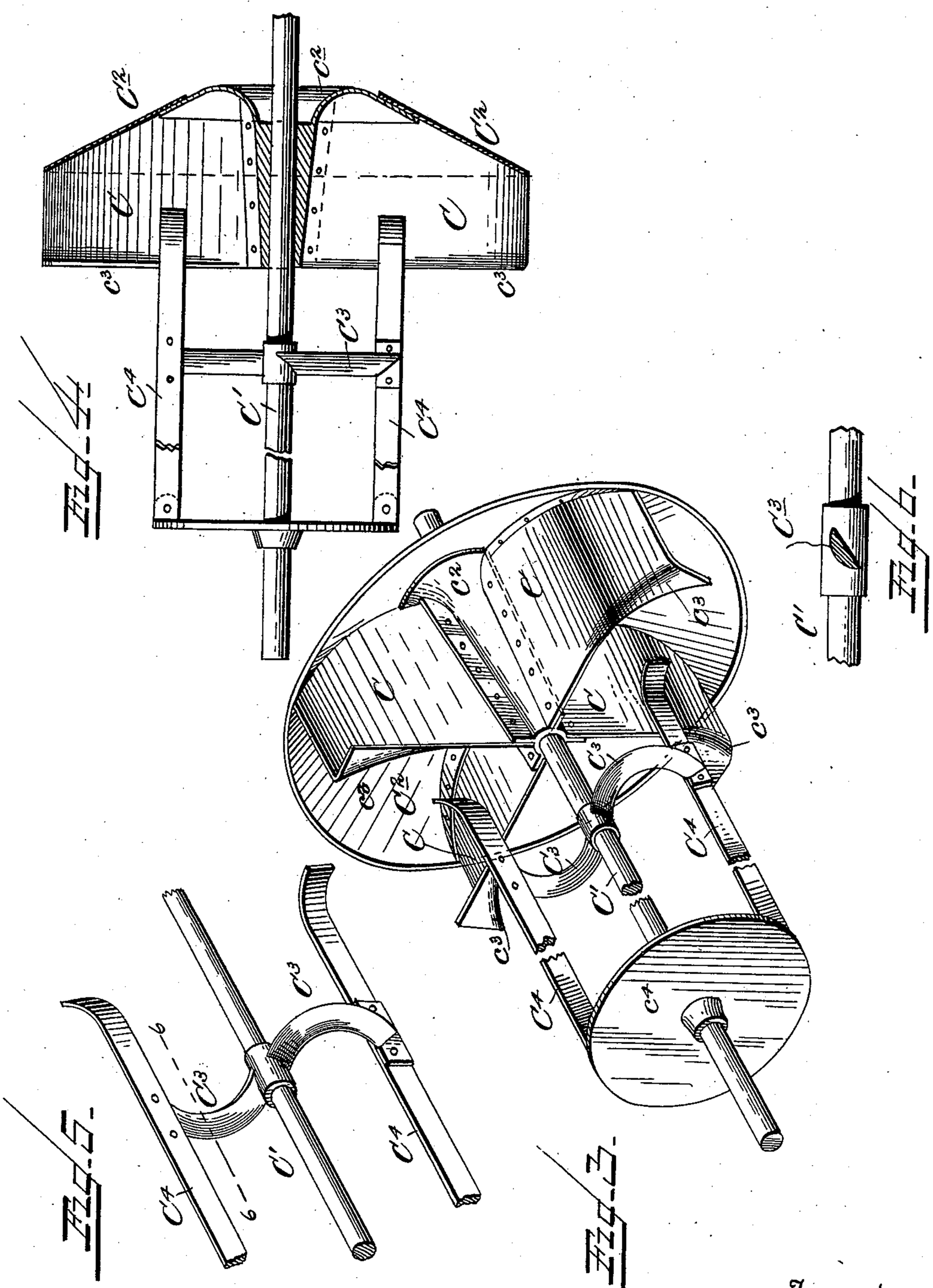

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UNITED STATES PATENT OFFICE.

FRANK. F. LANDIS, OF WAYNESBOROUGH, PENNSYLVANIA.

FAN FOR PNEUMATIC STACKERS.

SPECIFICATION forming part of Letters Patent No. 568,315, dated September 22, 1896.

Application filed May 15, 1896. Serial No. 591,702. (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 Fans for Pneumatic Stackers, &c.; 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.

Heretofore it has been the common practice to construct the fan and fan-casing of pneumatic stackers and such like machines to take in the straw, &c., as near the outer ends of the fan-blades as possible. As a result such fans frequently become choked, the straw is cut and torn into fragments because of the great speed of the edges of the blades and their consequent great striking and cutting force at the points where the straw comes against them, and a great amount of power is required to drive the fans, as all the resistance is at the outer ends of the blades. I have discovered that these difficulties are overcome by taking the straw into the fan at a point as near its axis as possible, where the speed is the slowest, the resisting elements the fewest, and the striking force of the blades the weakest.

The object of my present invention is therefore to provide a fan for use in pneumatic stackers and other machines operating under similar conditions, and for analogous purposes, constructed to produce a suction near its axis which will draw in the product to be discharged at this point; and it consists in such construction of fan and arrangement of the parts thereof whereby this object is accomplished, and other details of construction, 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 sectional view through the rear end of a separator-casing, looking toward the side thereof to which the fan is attached, as indicated by the arrows on the dotted line *y y* in Fig. 2, the separator-casing being itself indicated by dotted lines; Fig. 2, a horizontal sectional view as seen when looking in the direction indicated by the arrows from the dotted line *x x* in Fig. 1; Fig. 3, a perspective view of the fan structure proper and reel with central portion broken out, separate; Fig. 4, a horizontal section looking in the direction indicated by the arrows from the dotted line 4 4 in Fig. 1; Fig. 5, a detail view in perspective of a portion of the reel, and Fig. 6 a detail section on the dotted line 6 6 in Fig. 5.

In said drawings the portions marked A represent the separator frame or casing, B the fan-casing, and C the fan.

The separator-casing A may be the casing of any separator with which it is desired to use the fan, or the frame of any other machine with which it is to be used, and needs no special description herein.

The fan-casing B is not in itself of a form widely differing from others in use, except that its outer side is bulged out toward its center, forming a cone-shaped central portion *b'*. A discharge-pipe *b* leads therefrom to the main discharging-chute or stacker, as is usual.

The fan C is mounted on a shaft C', which is journaled in a bearing formed in the center of the outer side of the fan-case at one end, and in a box *c*, mounted on the opposite side of the separator-casing, at its other end. A pulley *c'* is mounted on the outer end of said shaft for gearing it to the driving-power. The fan proper consists of an appropriately-formed hub secured to said shaft, and having radial flanges to which the inner ends of the blades are riveted throughout their entire width. The inner end of said hub has a wide cone-shaped flange c^2 formed thereon, and to this is riveted a cone-shaped disk C^2, the point of the cone extending toward the rear side of the casing, corresponding in shape to the shape of the central portion of said casing. The fan-blades are made correspondingly tapered on their rear edges and are there formed with flanges which fit against the face of said disk C^2, to which they are securely riveted. The blades are formed straight in cross-section, but have a tapered lip c^3, turned in the direction of the motion of the fan, starting from a point about midway of their length and widening to their outer ends, the purpose of which will be presently described.

Instead of having these several cone-shaped parts formed turned inward close to the axis, they may all continue in straight lines to a point at the center, if preferred, my purpose in adopting the form shown being to set the shaft-bearing in as much as practicable without in any degree impairing the efficiency of the construction. I also prefer to mount a reel on the shaft C′, which reel consists of the spider C^3, the head or disk c^4, and the ribs or blades C^4. The disk supports the outer ends of the blades and closes the end of the reel, insuring that the air shall come in from the sides. The spider supports the inner ends of the blades, and its spokes are formed curved back sharply from the ends to which the blades are attached, leaving a free unobstructed space behind said blades. Said spokes are also formed with smooth, straight faces on their sides toward the fan and are set at an angle to strike the air in their revolution, so as to assist in driving it toward said fan. (See Fig. 6.) The blades are narrow strips fastened at one end to ears on the disk c^4 and extending just to or slightly within the fan, being attached to the ends of the spokes of the spider back from said ends. Their front sides are smooth, unobstructed surfaces, and their extreme inner ends are curved back somewhat, as indicated in Fig. 2, to facilitate the delivery of the straw to the fan. There are two of these blades shown, and each is positioned to deliver the straw between two of the fan-blades, four of which are shown; but both the number of the reel-blades and the number of fan-blades may be varied, but in all cases the reel-blades are preferably positioned to deliver between the fan-blades, and I find very satisfactory results are attained by having one or more spaces between the fan-blades more than the number of reel-blades, which spaces will operate to gather the chaff, dust, dirt, &c., which fine particles may not be gathered up by the reel.

The fan thus formed consists of blades extending entirely to its hub, which increase in width toward their inner ends, one side being open to receive the product to be discharged and the other side closed to prevent interfering currents from the rear. The area of said blades increases in the direction of the decrease in their speed, over one-half the area of each being within a circle around the center of the fan the diameter of which is one-half the diameter of said fan, and their power of displacement is thus made greater at their inner ends to create the central suction required to draw the straw to the preferable entrance, as before described.

The operation is as follows: The fan being set in rapid motion, the blades, by reason of their great width and area at their inner ends, near the axis of the fan, tend to draw the air to this point, where the centrifugal force takes it up and propels it outward along the faces of said blades and through the discharge-tube, creating air-currents, as indicated by the arrows in Fig. 2. As the outer end of the reel is closed, the straw, &c., is drawn in over the sides and is carried along by said air-currents sliding on the face of the blades C^4, being given a spiral or twisting motion in its passage and sliding off the curved ends of said blades freely and easily into the wide-open space between two fan-blades, the rear one of which takes it up and by its centrifugal force violently propels it forward along its face and discharges it into the tube *b*. The inturned lips c^3 guard against said straw sliding back into the machine, off said fan-blades, before reaching said discharge-tube. By the time said straw reaches the outer ends of said blades it acquires the same momentum that it would receive if taken in at a point farther from the center, and is not cut up into fine pieces, but is delivered into the fan in the best form for receiving the full force of the action of the fan, whereby the stacker is afforded the greatest possible capacity with the expenditure of the least amount of power, and the least possible resistance to said power is offered.

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

1. A fan for pneumatic stackers, and such like machines, the blades whereof extend to its hub where they are widest and are secured to said hub throughout their width, and are formed of decreasing width from said hub to their outer ends, substantially as set forth.

2. A fan for pneumatic stackers, and such like machines, the blades whereof are each formed with over one-half their surface within a circle around the center of the fan the diameter of which is one-half the diameter of said fan, substantially as set forth.

3. A fan for pneumatic stackers, and such like machines, the blades whereof extend to the hub and are tapered on their rear sides from said hub toward their outer ends, and have a cone-shaped disk secured to said tapered edges closing the rear side of the fan, substantially as set forth.

4. In a fan for pneumatic stackers, and such like machines, the combination of the shaft, the fan-hub mounted on said shaft in said casing, the cone-shaped disk secured to the rear end of said hub and tapering back into the casing, and the fan-blades formed with their rear edges meeting and secured to said disk and with their inner ends secured to said hub, substantially as set forth.

5. The combination of the separator-casing, the fan-casing secured thereon and communicating therewith, the fan-shaft extending across said separator and journaled at one end in a box on one side thereof and at its other end in a box on the outer side of the fan-casing, the fan mounted on said shaft in said casing, and a reel mounted on said shaft in the said separator-casing, the blades whereof extend to a point between the fan-blades, substantially as set forth.

6. The combination with the fan, C, of the reel mounted on its shaft outside the fan-casing, the ends of the blades of which extend to or within said fan at points between its blades, substantially as set forth.

7. The combination with the fan, of the reel mounted on its shaft, the blades whereof are curved backward at their inner ends and extend to within or in close proximity to said fan between its blades, substantially as set forth.

8. The combination with the fan, of the reel composed of horizontal blades supported on the spokes of a spider, which spokes are curved backwardly from the face of said blades immediately behind them, whereby they permit the straw to slide freely on said faces, substantially as set forth.

9. The combination with the fan, of the reel composed of the blades supported on a spider adjacent to the inlet to the fan-casing, the spokes of said spider being formed with an inclined face set toward said fan, substantially as set forth.

10. The combination with the fan, of the reel formed of a solid disk at its outer end, a spider intermediate of its length, and ribs supported by said disk and spider, substantially as set forth.

11. The combination of the separator-casing, the fan-casing mounted thereon and communicating therewith, the fan-shaft extending across the said casings, the outer side of said fan-casing being formed bulged out toward its center, the fan mounted on said shaft within said fan-casing and consisting of blades with their rear edges connected and closed by a cone-shaped disk with its point toward the rear side, the reel mounted on said shaft and arranged with its blade extending to a point slightly within said fan and between its blades, all substantially as set forth.

12. A fan for pneumatic stackers, and such like machines, formed with its blades extending from hub to periphery of fan, said blades being of greatest transverse depth at or near the center of fan, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK. F. LANDIS.

Witnesses:

S. H. BROWN,

A. H. BETTS.