

No. 819,171.

PATENTED MAY 1, 1906.

W. H. ROBINSON.
DOWN SEPARATING APPARATUS.
APPLICATION FILED FEB. 11, 1902.

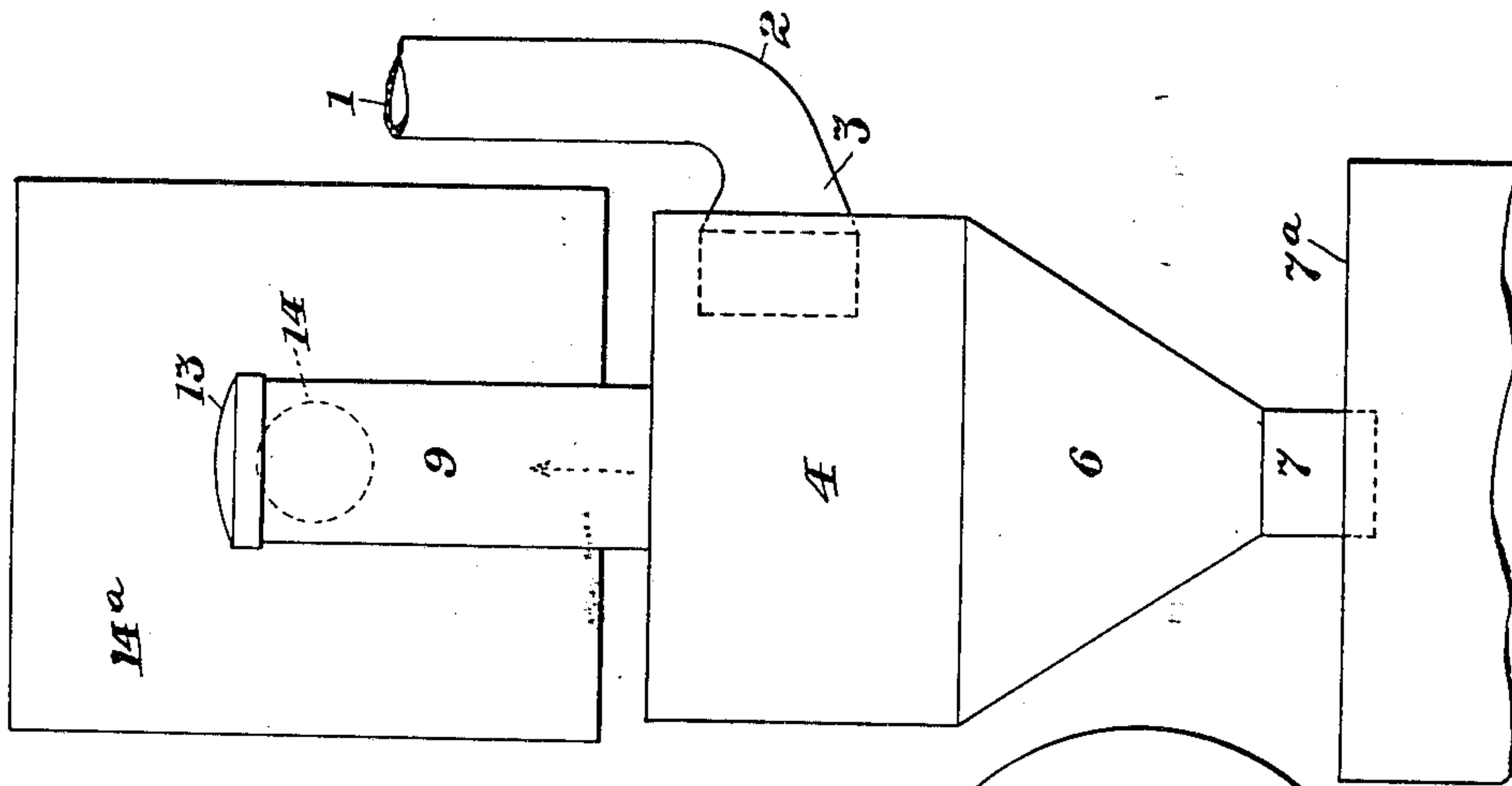


Fig. 1.

Fig. 2.

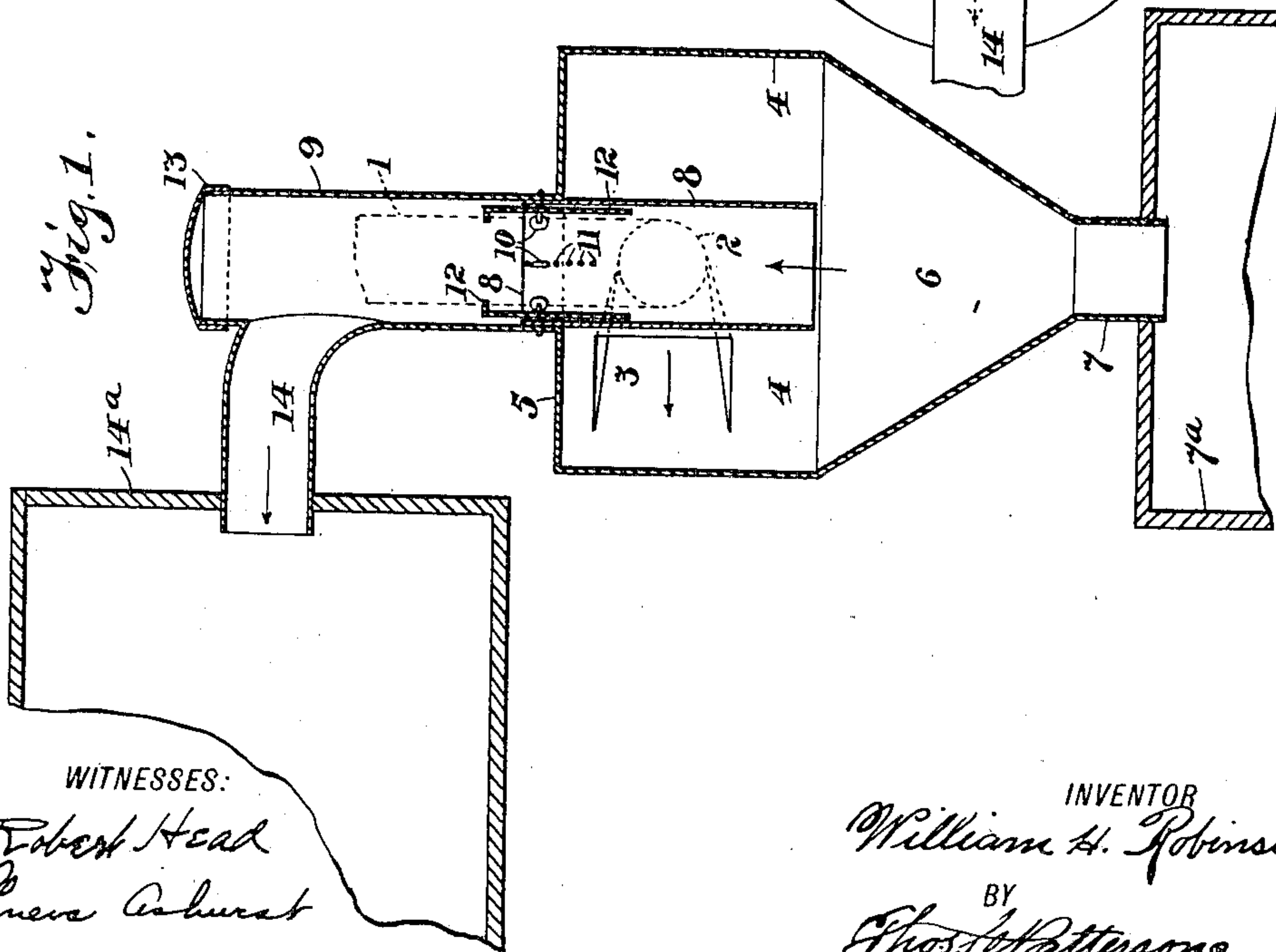
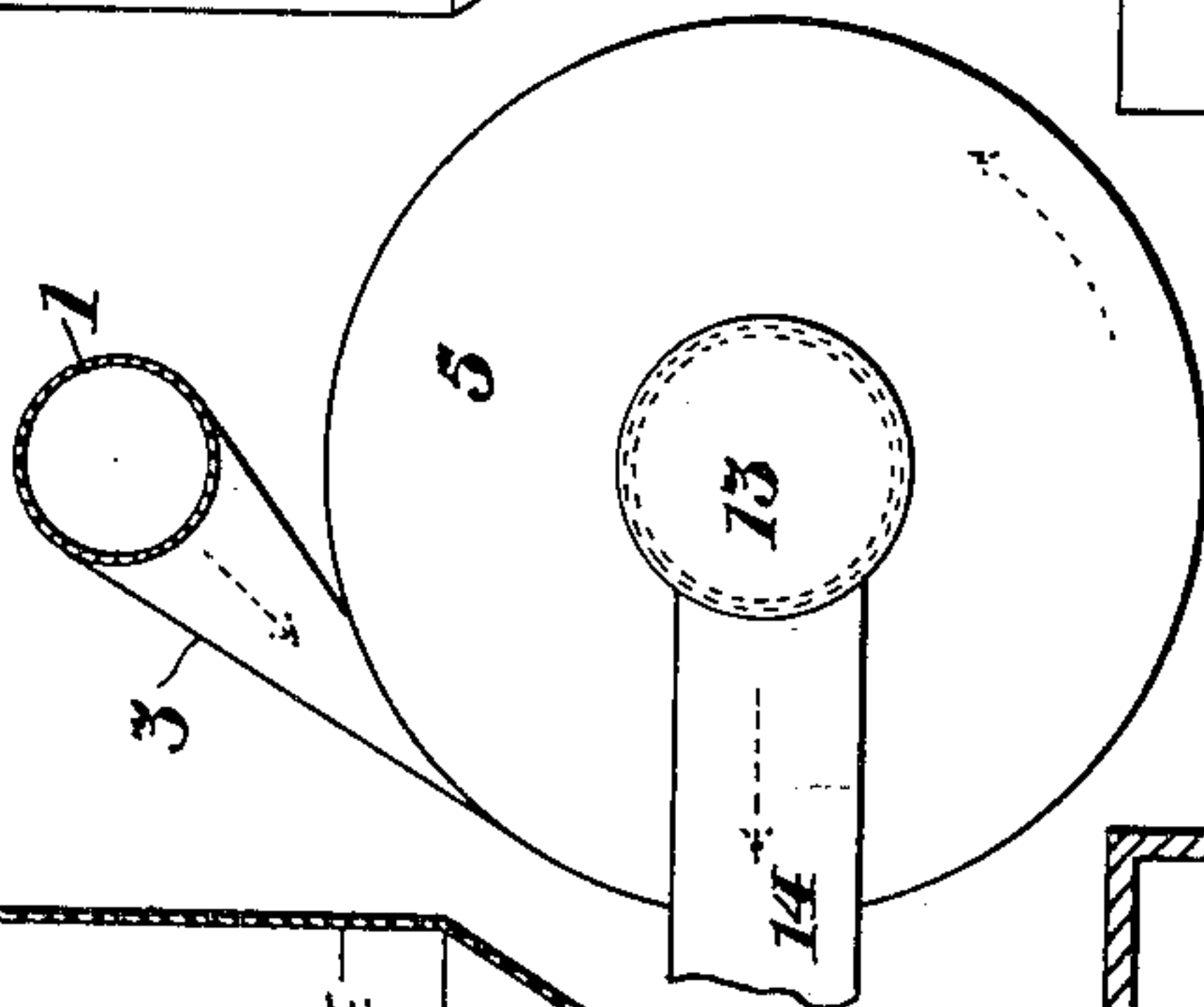


Fig. 3.

WITNESSES:

Robert Head
Genevieve Ashurst

INVENTOR
William H. Robinson
BY
Chas. C. Patterson
ATTORNEY

UNITED STATES PATENT OFFICE

WILLIAM H. ROBINSON, OF STEINWAY, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HIMSELF, AND W. M. HANES, OF WINSTON SALEM, NORTH CAROLINA.

DOWN-SEPARATING APPARATUS.

No. 819,171.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed February 11, 1902. Serial No. 93,559.

To all whom it may concern:

Be it known that I, WILLIAM H. ROBINSON, a subject of the King of Great Britain, and a resident of Steinway, borough of Queens, city of New York, and State of New York, have invented certain new and useful Down-Separating Apparatus, of which the following is a specification.

This application relates to an apparatus for separating down from contour feathers.

The mixed down and contour feathers, as they are plucked from the bird or fowl, are after passing through a cleansing operation forced by an air-blast into a round chamber and caused to circulate therein, during which movement a separation has taken place, the larger of the contour feathers escaping through one outlet, and the down, mixed with a quantity of small or medium contour feathers, passing through a different outlet.

My invention consists in certain features of construction, combinations of devices, and arrangements of parts, all as will be more fully hereinafter set forth, and particularly pointed out in the concluding claims.

In the accompanying drawings, Figure 1 is a central vertical section of an apparatus made in accordance with my invention. Fig. 2 is a side elevation, and Fig. 3 a plan, of the apparatus.

In the several views like parts are designated by like numerals of reference.

The feathers may be blown into the separator through any convenient supply-pipe 1, which may descend alongside of the separator and communicate with the latter by means of an elbow 2 and a box 3, the walls of the latter converging or contracting and its top and bottom separating as they approach the drum of the separator so as to match a vertical slit cut in the wall of the drum and seen at Fig. 1. The box is arranged at a tangent to the drum, as seen clearly at Fig. 3, so that the mixture of air, down, and contour feathers may be discharged into the drum in a tangential direction, so as to set up a rotary circulation of the mixture within the drum.

The principal chamber of the separator comprises both a drum, which is designated as 4 and has a head or top 5, and also a hollow cone or funnel 6. The drum is cylindrical in form and vertically arranged and may be supported in any suitable manner. Its open

lower end is joined directly to the top of the funnel 6, which may be termed a "tapering" connection between the drum and a discharge-pipe 7, which is connected to the apex of the cone and through which the contour feathers are conveyed to a bin 7^a.

Extending downwardly into the chamber to a point nearly level with the bottom of the drum is arranged a central vertical tube or hollow core 8, by which the down is collected and which affords a passage for the down out of the main chamber and into a vertical pipe or conductor 9, which is erected upon the drumhead and with the lower portion of which the collector 8 has a telescopic connection.

The collector 8 and conductor 9 may, if desired, be rigidly joined or formed in one piece, both being firmly fixed in place; but I prefer to adjust the collector 8 vertically, and to this end I provide means for lowering and raising the same and for sustaining it at different elevations. Said adjusting means may consist of a number of wing-screws 10, passing loosely through perforations 11, made in the upper part of the collector or tube 8 and tapped into the lower part of the pipe or stack 9. There may be provided any desired number of vertical rows of holes 11, and the tube 8 may be adjusted to as many different elevations as there are holes in each row. Handle-bars 12 may be secured to the inner walls of the tube 8, so as to facilitate the adjustment thereof, and the pipe 9 may be provided with a cap 13, which may be removed at any time so as to afford access to the handle-bars and wing-screws. If desired, the tube 8 may be lengthened and extended farther up into the pipe 9, and the well-known equivalent of a single vertical slot may be substituted for each row of holes, so that a mere loosening of the wing-screws will enable the tube to be moved, thus avoiding the necessity of taking the screws out and reinserting them.

Near its upper end the pipe 9 may open into any suitable conductor 14, through which the down may pass to a bin or other receptacle 14^a.

Although it is evident that any air which is forced into the chamber through the box 3 must escape through the exits 7 and 8, still it is desirable not to permit the immediate vent

of the air, but rather to confine it within the chamber for some time, so as to afford the down and the contour feathers an interval in which to become separated. This result is accomplished by causing the air to travel around the drum many times between its ingress and egress, the rotary impulse being given to the air, as above explained, by giving a tangential direction to the entering blast. As the inrush of the air-blast is continuous, the air within the chamber must eventually become forced out through the vents, and hence the air tends to swirl around the drum in a spiral path, or, in other words, it has a combined rotary and downward movement, the former being caused by the impact of the air-blast and the latter being occasioned by the necessity of reaching the vent 7, through which a large proportion of the air finally escapes. It will also be understood that in passing from the cylindrical drum into the conductor 7 the air will follow a course which is not only spiral, but also centripetal, owing to the convergence or conical arrangement of the sides of the funnel 6. Thus the general movement of the air while confined within the chamber may be likened to the movement of a cyclone, the outer portions of the blast traveling at a high rate of speed in a spiral and centripetal downward direction and the central or inner portions of the air moving at a much less rapid rate, and hence being relatively calm.

The constantly-inrushing air has a churning effect upon the swirling mixture of air, down, and contour feathers, whereby the separation of the contour feathers from the down is promoted. The down and said feathers become eventually separated because of the cyclonic movement of the air, the effect of said movement upon the contour feathers being unlike its effect upon the down, so that said feathers take one course in escaping from the chamber or shell, while the down takes a different course and passes out through a special conductor, the latter extending to that point within the chamber where the down may be collected to the best advantage. The effect of the cyclone upon the contour feathers is to cause them to fly toward the walls of the chamber, this movement being due to the action of centrifugal force, to which the said feathers yield more readily than does the down, owing to their comparatively dense or heavy structure. As said feathers brush the walls of the chamber during their entire downward passage, they may be considered as forming a layer or lining for the said walls, said lining being composed of large, medium, and small contour feathers. The effect of the cyclone upon the fluffy down, however, is not so violent, and it does not tend to fly against the walls of the chamber, but rather to float about in the more moderate current which immediately sur-

rounds and underlies the core 8, said core, as above explained, being made hollow and open at its lower end, said end thus forming a mouth for affording a vent for the comparatively calm central air, and hence serving to collect the down held in suspension by said central body of air. Thus the separation of the down from the contour feathers occurs partly because of the churning action of the air-blast upon the swirling mixture within the cyclone-chamber, partly because of the segregation of the comparatively dense contour feathers which is caused by the operation of centrifugal force, partly because said feathers are forced to line the walls of the chamber in passing down to the vent 7, whereby their segregation is preserved notwithstanding the continued presence of down in the chamber, and partly because of the existence of a collector in the midst of the down which is suspended in the calmer central air and into which said air may pass independently of the violently-moving currents which strike down through the conical outlet.

It will be understood that it would be disadvantageous to arrange either the vent 7 or the mouth of the down-collector in such a relation to the blast-inlet that a ready egress would be offered to the air immediately upon entering the drum or before the separation of the down from the contour feathers. Such a contingency is avoided by placing the vent 7 at the apex of the cone 6, far removed from the air-inlet 3, and also by placing the mouth of the collector at a lower level than or out of line with said inlet, means being also provided for insuring that the air shall be in rapid rotation at the time that it reaches the neighborhood of said down-collecting mouth, so that the centrifugal pressure of the air may overbalance what tendency it may have to escape through said mouth into the outer atmosphere, and hence so that said rapidly-rotating body of air, together with the contour feathers moving therewith, may continue its spiral course to the vent 7.

One of the features of my invention which is of great value in this art is the centrally-arranged core of the cyclone-chamber for controlling the movement of the air and directing it in a circular path or course. So far as this function of the device 8 is concerned it is immaterial whether or not said device also serves as a down-collector or whether or not it is of hollow construction. A great advantage is secured by the arrangement of said core opposite to the air-supply box 3, inasmuch as the whirling air, although continually churned by the entering blast, is still forced to continue in a circular course and the separating action or effect of the cyclone is preserved.

I prefer to make the down-collector 8 adjustable, so that it may be set at the exact point where nothing except down will be

likely to enter its mouth. As will be gathered from the foregoing description, an adjustment of said collector to a high level would offer a more available vent for the air, and as a result there would be some liability of a premature escape thereof—that is, the air would get into the mouth of the collector before a thorough separation of the down from the contour feathers had occurred, so that a quantity of small and medium sized feathers would be ejected together with the down. On the other hand, if the mouth of the collector should be adjusted to too low a point and approach too closely to the apex of the cone the down floating in the central portions of the apparatus would not find such a ready escape, and consequently in tending downwardly toward the depressed mouth of the collector would be liable to get caught in the outer cyclone-belt, thereby becoming remixed with the contour feathers and passing down therewith through the outlet 7, while a smaller quantity of down would of course be collected by the device 8 than would be the case if the latter were adjusted to the proper height. From these premises it follows that by inspection of the down as it emerges from the apparatus into the bin the operator is enabled to judge whether or not the collector 8 needs readjustment, and if so, in what direction and to what extent. If contour feathers appear mingled among the down feathers or down, he should lower the collector. On the other hand, if he perceives that the down is discharging too scantily into the bin he should raise the collector. By means of ordinary intelligence the operator may after acquiring a little experience adjust the collector readily to the required point, and of course it will be understood that when it is once adjusted correctly frequent readjustment will not be necessary unless exceptional conditions should arise.

Many other variations may be resorted to in details of construction and arrangement within the scope of the invention. It is not essential in all forms of the invention that the tube 8 telescope within the pipe 9, as obviously the tube and pipe could be made in a single piece which could be adjusted vertically as a whole. Nor is it essential in all forms of the invention that the down pass in an upward direction out of the drum so long as the mouth of the down-collector is arranged within the cyclone-chamber.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. A down-separator consisting of a cyclone-chamber having both an inlet for an air-blast and an outlet for the contour feathers, and also provided with a collector for the down, said collector extending into the interior of the cyclone-chamber in combination with a bin for the separated contour feathers and a separate bin for the down;

said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

2. A down-collector consisting of a cyclone-chamber having both an inlet for an air-blast and an outlet for the contour feathers, and also provided with a collector for the down, said collector extending into the interior of the cyclone-chamber and terminating about centrally or midway between the ends and sides thereof in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

3. A down-separator consisting of a circular cyclone-chamber having both an inlet for an air-blast and an outlet for the contour feathers, and having a hollow core which collects the down and conducts it out of the chamber in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

4. In a down-separator, a cyclone-chamber consisting of a drum joined to the upper end of a downwardly-tapering cone, and a tubular down-collector extending downwardly from the head of said drum into the interior thereof in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

5. In a down-separator, a cyclone-chamber consisting of a drum and a cone and having a tubular down-collector which extends from the head of the drum toward the apex of the cone, and terminates between said head and said cone-apex in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

6. In a down-separator, a cyclone-chamber having a tapering outlet for the contour feathers, a core, and an outlet for the down in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

7. In a down-separator, a cyclone-chamber having a core and also having an outlet for the down and an outlet for the contour feathers in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cy-

clone-chamber and the central outlet for the down, respectively.

8. In a down-separator, a cyclone-chamber having a core and also having an outlet for the down at said core in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

9. In a down-separator, a cyclone-chamber having a core and also having an outlet for the down at said core, one portion of said chamber having a conical formation in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

10. A down-separator comprising a cyclone-chamber and an adjustable vent in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

11. A down-separator comprising a cyclone-chamber, an outlet for the contour feathers, a collector for the down, and means for effecting a relative adjustment between said outlet and said collector in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

12. A down-separator comprising a cyclone-chamber, said chamber consisting of a drum and a cone joined thereto, and an adjustable outlet for the down in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

13. A down-separator consisting of a cyclone-chamber having both an inlet for an air-blast and an outlet for the contour feathers, and also provided with an adjustable collector for the down, said collector extending into the interior of the cyclone-chamber in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

14. A down-collector consisting of a cyclone-chamber having both an inlet for an air-blast and an outlet for the contour feathers, and also provided with an adjustable collector for the down, said collector extending into the interior of the cyclone-chamber and terminating about centrally or midway between the ends and sides thereof in combina-

tion with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

15. A down-separator consisting of a circular cyclone-chamber having both an inlet for an air-blast and an outlet for the contour feathers, and having an endwise adjustable hollow core which collects the down and conducts it out of the chamber in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

16. In a down-separator, a cyclone-chamber consisting of a drum and a cone and having an internally-arranged adjustable down-collector in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

17. In a down-separator, a cyclone-chamber consisting of a drum joined to the upper end of a downwardly-tapering cone, and a vertically-adjustable tubular down-collector extending downwardly from the head of said drum into the interior thereof in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

18. In a down-separator, the combination of drum 4, cone 6, adjustable tube 8, and pipe 9 in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

19. In a down-separator, the combination of drum 4, cone 6, adjustable tube 8, pipe 9, and cap 13 in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

20. A down-separator comprising a cyclone-chamber having a tapering outlet for the contour feathers, a core, an outlet for the down, and means for adjusting the last-mentioned outlet in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

21. In a down-separator, the combination of drum 4, cone 6, tube 8, pipe 9, and wing-

screws 10 in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

22. In a down-separator, the combination of drum 4, cone 6, tube 8, pipe 9, wing-screws 10, and perforations 11 in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

23. The combination of box 3, drum 4 having head 5, cone 6, pipe 9, cap 13, tube 8, wing-screws 10, and perforations 11 in combination with a bin for the separated contour feathers and a separate bin for the down; said bins being in closed communication with the outlet from the cyclone-chamber and the central outlet for the down, respectively.

24. A down-separating apparatus comprising a cyclone-chamber having an inlet for a blast of air, feathers and down, and having an outlet for the contour feathers, a bin in closed communication with said outlet, said chamber having a tubular core which terminates at its lower end within the chamber, a second bin, a closed conductor from said core

to said bin, an opening being provided in said conductor to give access to said core, and a cover for said opening.

25. A down - separating apparatus comprising a cyclone-chamber having a lower outlet for contour feathers; a bin in closed communication with said outlet; said chamber having an upper central collector for down; said collector being adjustable for height; a conductor surmounting said conductor, and provided at its upper end with an opening and a cover, and a pipe connected to said conductor; and a bin to which said pipe leads.

26. A down - separating apparatus comprising a cyclone-drum, having an inlet for a blast of feathers and down, a bottom outlet for feathers, a bin in closed communication with said outlet, a top outlet for down, a second bin in closed communication with top outlet, a tubular central collector adjustable for height, an opening being provided to give access to said collector for adjusting the same, and a cover provided for closing said opening.

Signed at New York, in the State of New York, this 17th day of December, A. D. 1900.

WILLIAM H. ROBINSON.

Witnesses:

JOHN A. GALVIN,

THOMAS C. PATTERSON.