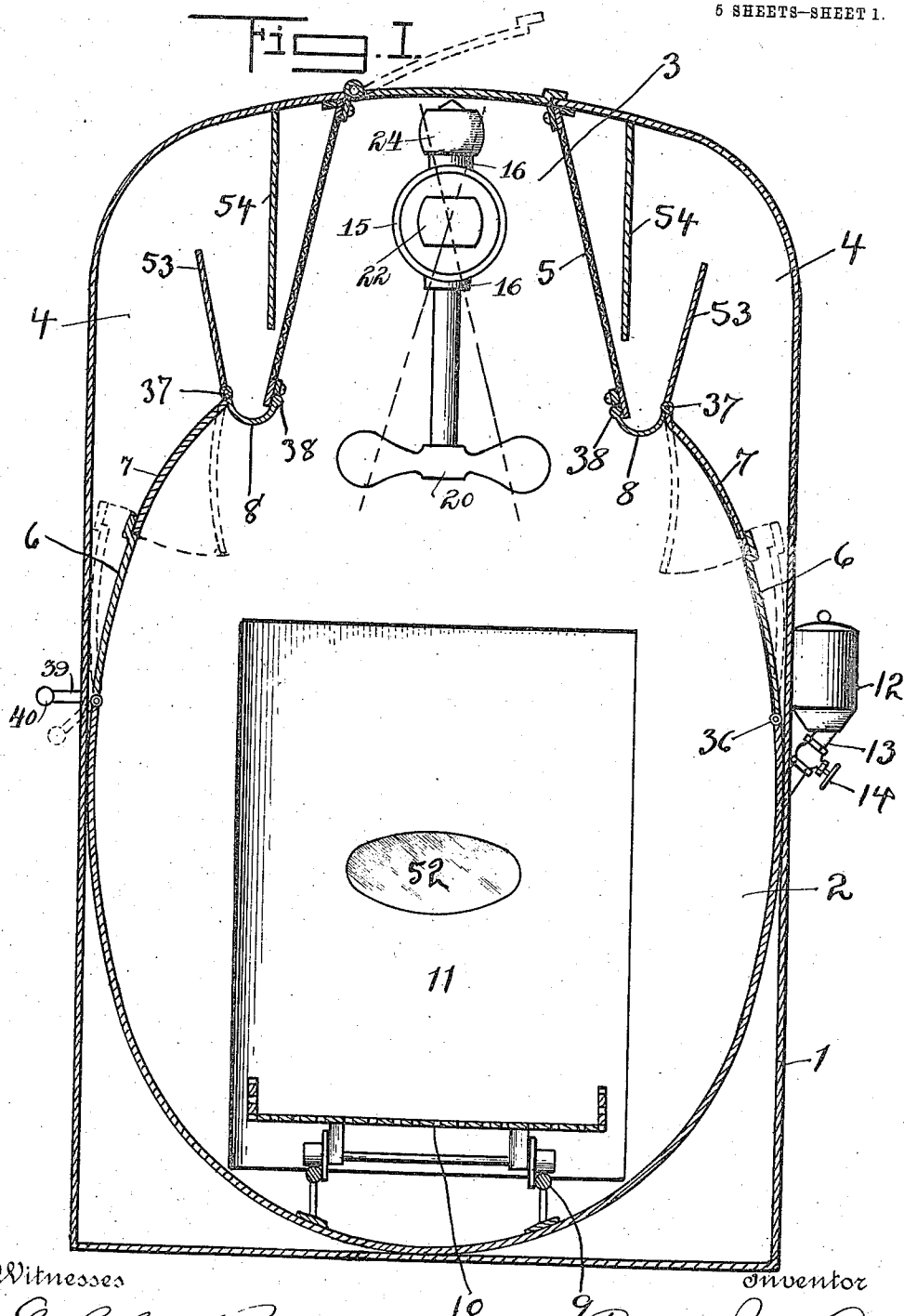


R. W. LOTZ.  
 MACHINE FOR COATING ARTICLES WITH PULVERULENT MATERIAL.  
 APPLICATION FILED FEB. 8, 1911.

Patented July 29, 1913.

5 SHEETS—SHEET 1.



Witnesses

*L. Cloud Newman.*  
*A. M. Wilson*

Inventor

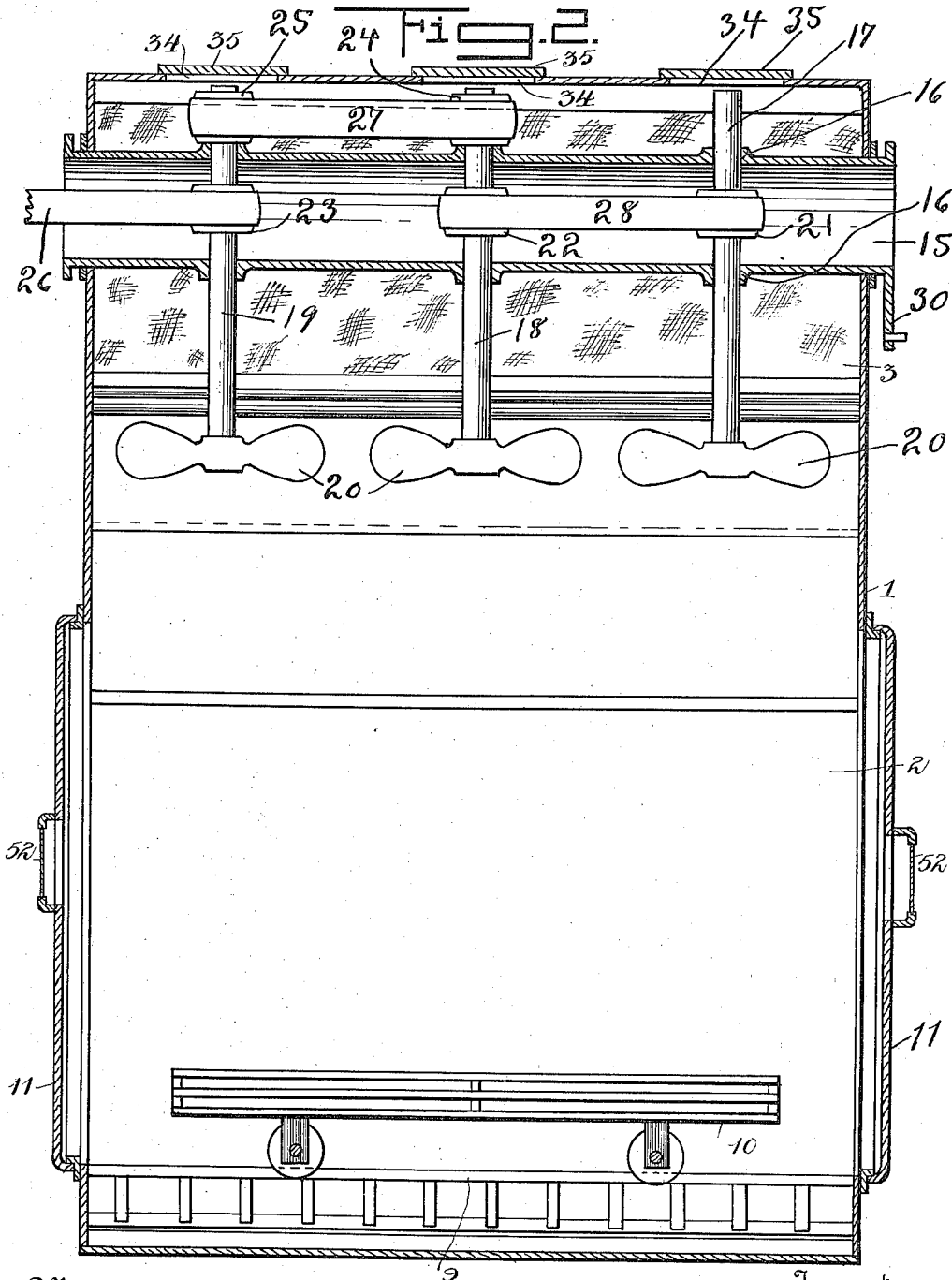
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6 SHEETS—SHEET 2.



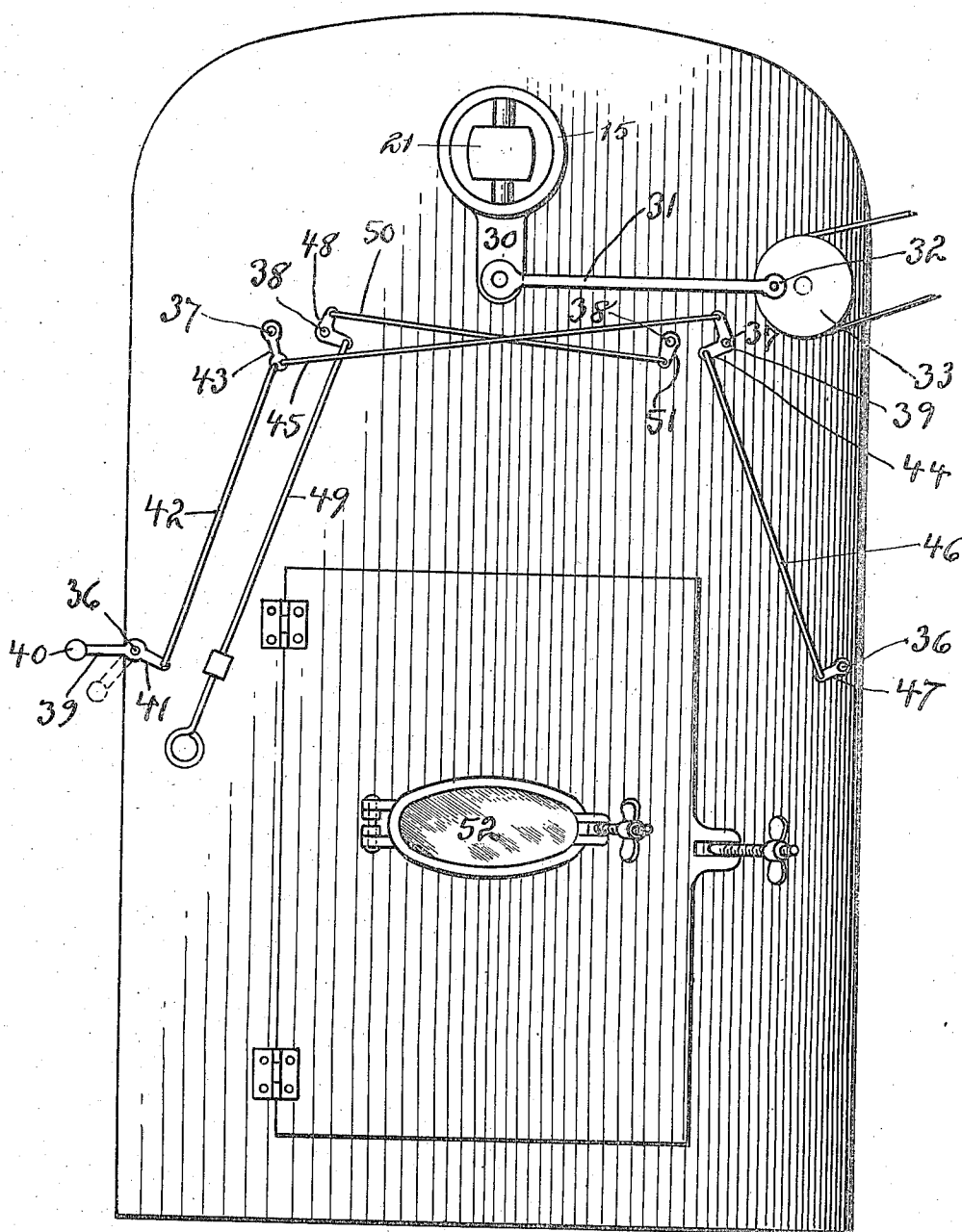
Witnesses

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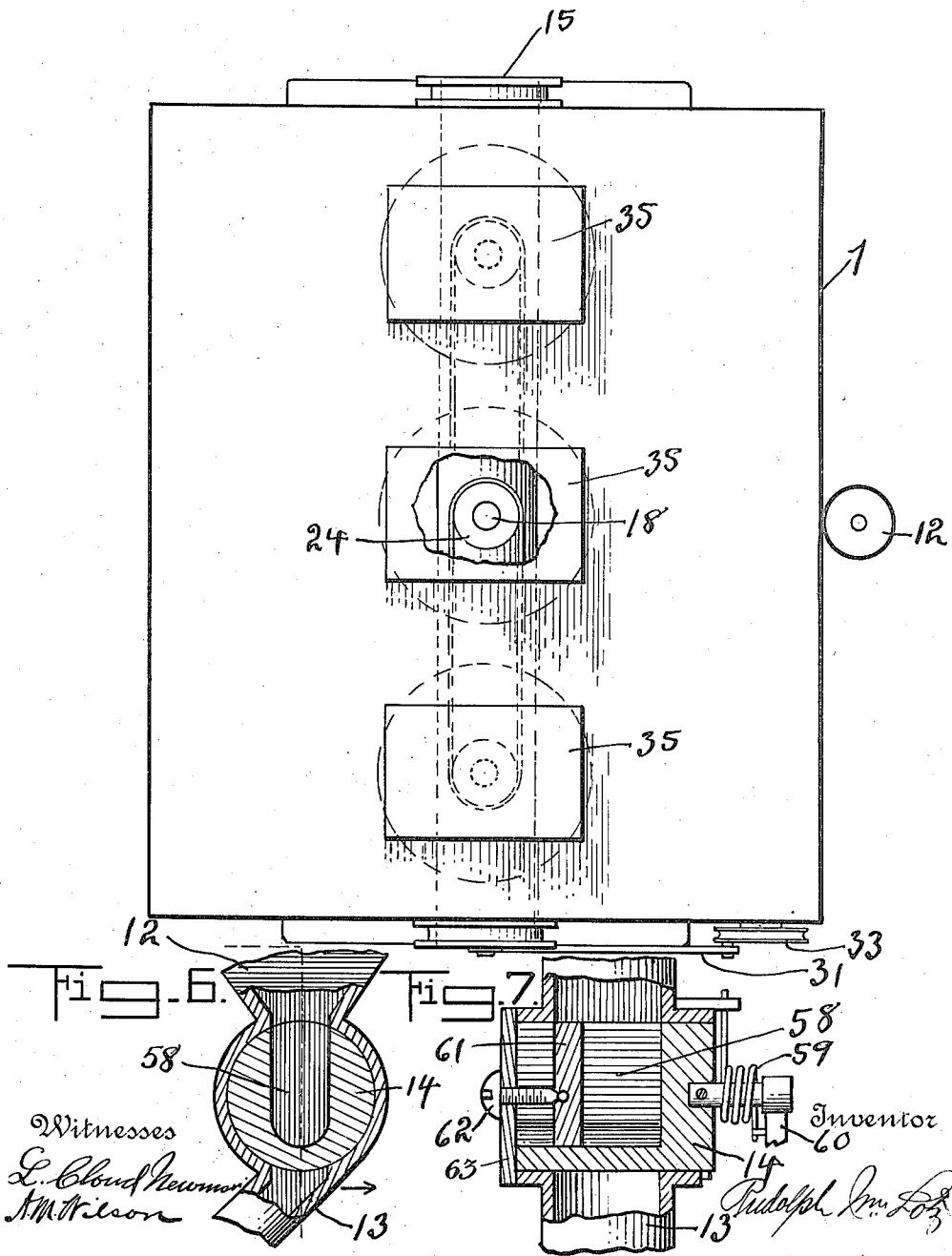
Fig. 3.



Witnesses  
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Fig. 4.

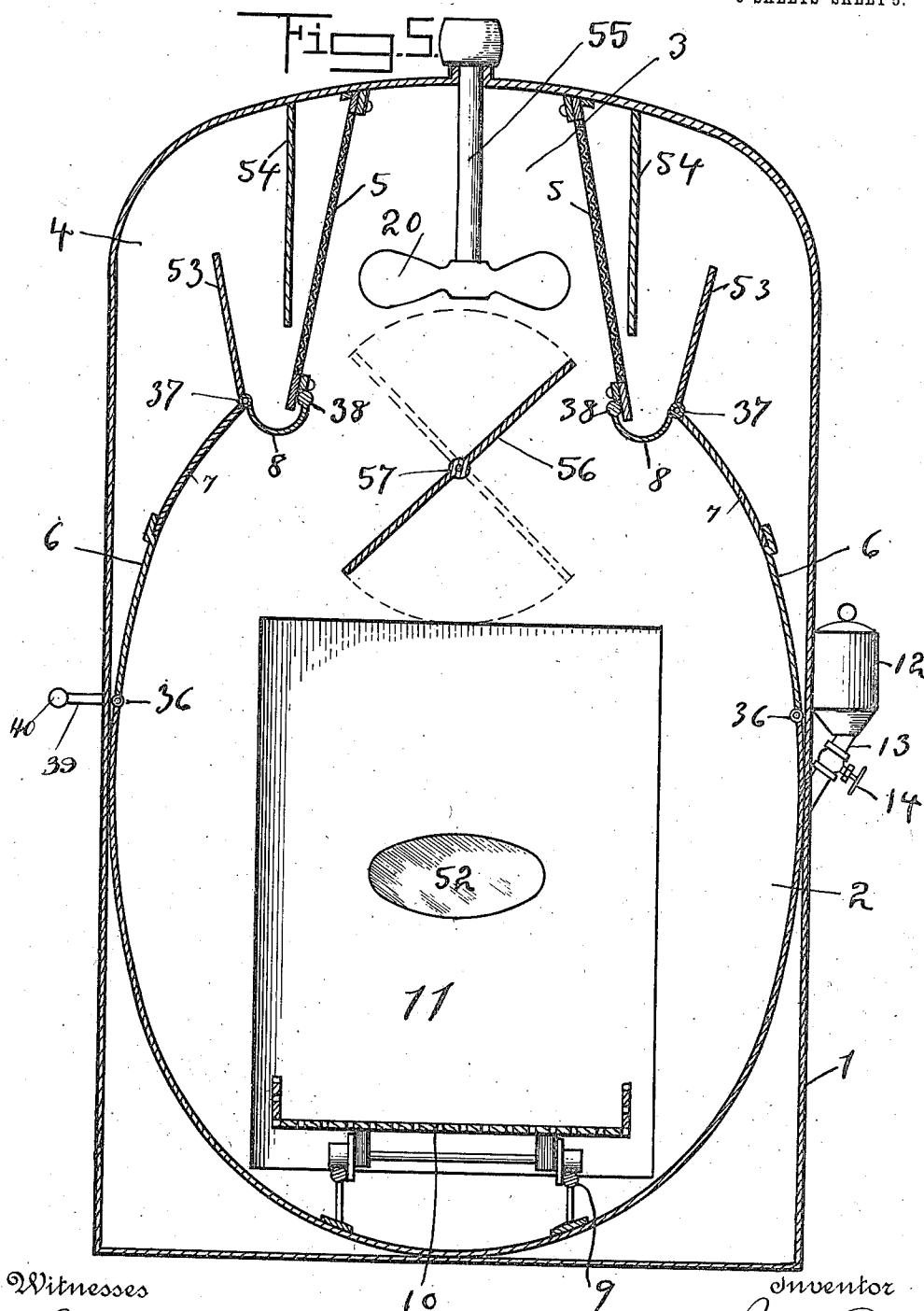


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6 SHEETS—SHEET 5.



Witnesses

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# UNITED STATES PATENT OFFICE.

RUDOLPH WM. LOTZ, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO  
BRADLEY & VROOMAN CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MACHINE FOR COATING ARTICLES WITH PULVERULENT MATERIAL.

1,068,680.

Specification of Letters Patent.

Patented July 29, 1913.

Application filed February 8, 1911. Serial No. 607,411.

*To all whom it may concern:*

Be it known that I, RUDOLPH WM. LOTZ, a citizen of the United States, and residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Coating Articles with Pulverulent Material, of which the following is a specification.

This invention relates to machines for coating articles with pulverulent material and has for its particular object to provide a machine of this character in which air currents of high velocity are provided for carrying the coating material with equal force to all parts of the articles to be coated, and consists in the features of construction and combination of parts hereinafter fully described and claimed.

In the accompanying drawings illustrating a suitable embodiment of the invention, Figure 1 is a vertical transverse section of a machine constructed in accordance with my invention. Fig. 2 is a central vertical longitudinal section of the same. Fig. 3 is an end elevation of the same. Fig. 4 is a top plan view of the same. Fig. 5 is a view similar to Fig. 1 illustrating a modified form of construction, and, Figs. 6 and 7 are detail views showing means employed for feeding measured quantities of coating material to the coating chamber.

In coating articles with pulverulent material, it is desirable that the conveying air currents should impinge with equal force upon opposite faces of the articles to be coated and that the same shall furthermore be deflected at various angles to the articles to be coated so as to insure the application of the coating material to every point in the surface of the articles and with such force as to cause the powder particles to become embedded as far as possible in the adhesive coating or sizing previously applied to the articles.

It is further desirable that after having applied the coating material to the surface or surfaces of the article to be coated that the air currents devoid of coating material should impinge with such force upon the coated surfaces as to remove therefrom all surplus particles which may have become lodged upon such surfaces but not engaged therewith by the adhesive coating applied thereto.

The main object of my invention is to pro-

vide means whereby the foregoing results are obtained, other objects of the invention being to provide the coating chamber receiving the articles to be coated of such shape as to be completely swept at every point by the air currents so as to prevent the deposit of coating material upon the floor or other parts of the chamber whereby a waste of the same is caused; to provide means forming a part of but divided from the coating chamber in which the surplus of unapplied coating material is collected when it is desired to clarify the air contained within the chamber of unapplied powder particles; to provide means whereby the powder thus collected may be delivered directly back into the coating chamber to be conveyed to the surface of the next succeeding block of articles introduced into the coating chamber; to provide means for admitting fresh air to the chamber when it is desired; to provide means whereby predetermined measured quantities of coating material may be introduced into the coating chamber; and to provide means for varying said measured quantities at will.

Further objects of the invention will appear from the following specification.

The machine comprises a casing 1 which is substantially rectangular in cross-section and is provided with a coating chamber 2 which is substantially elliptical in vertical transverse section so that the side walls and bottom of the same are continuously curved. The upper portion of the coating chamber 2 is provided with a relatively narrow extension 3 which for purposes of this description, I will term the suction chamber. The free spaces in the upper corners of the casing 1 separated from the coating chamber 2 and suction chamber 3 constitute dust-collecting chambers 4. These communicate with the suction chamber 3 through membranes 5 of a suitable fabric and communicate with the coating chamber 2 by means of the dampers 6 and 7 adapted to be manually-operated from the exterior of the machine to control said communication. Said dust-collectors 4 further communicate with the coating chamber 2 by means of dampers 8 which are preferably trough-shaped and adapted to receive the coating material received within the dust-collectors 4 and may be operated to deliver said coating material into the chamber 2 when desired.

Suitably supported upon the bottom of

the chamber 2 are rails 9 upon which the wheels of a truck 10 travel, the latter being adapted to carry the articles to be coated and being suitably equipped to properly support said articles. Said truck is herein illustrated more or less diagrammatically and is devoid of pins and the like for receiving the articles to be coated. Doors 11 at the ends of the coating chamber 2 permit the trucks to be inserted and removed, it being usual to provide means for continuing the rails 9 externally of the chamber. The web portions of the rails are preferably foraminous so as to provide ample openings therethrough for the passage of the air currents. So also the truck platforms are generally and preferably a skeleton structure providing ample free space of openings for the passage of air therethrough. These are well known details commonly practised in the arts and which consequently do not require particular illustration.

Externally of the coating chamber 2 is a receptacle 12 for the coating material, the latter having a funnel-shaped bottom communicating with the tube 13 with the coating chamber 2 at any convenient point. In said tube 13 there is disposed a valve 14 manually operated and preferably so constructed as to be normally maintained closed by a spring and when actuated against the action of said spring to deliver a measured quantity of coating material into the coating chamber. The said valve is clearly illustrated in Figs. 6 and 7 and will be hereinafter more particularly described.

Passing longitudinally through the suction chamber 3 and journaled at its ends in suitable bearings provided therefor in the end walls of the casing is a cylinder 15. The latter is provided at various points between its ends with suitable pairs of diametrically oppositely disposed bearings 16 in which shafts 17, 18, and 19 respectively are journaled. Each of the latter carries a fan 20 of the propeller type at its lower end and is equipped within the cylinder 15 with a pulley 21, 22, and 23 respectively. The other ends of said shafts project above said cylinder 15, the shafts 18 and 19 being equipped upon said projecting ends with pulleys 24 and 25 respectively. The pulley 23 is geared by means of a belt 26 with a suitable source of power such as a counter-shaft and is geared to the shafts 17 and 18 by means of the belt 27 trained over the pulleys 25 and 24 and by means of the belt 28 trained over the pulleys 22 and 21. The said pulleys and belts constitute a convenient form of gearing for transmitting motion to all of said shafts from a single source of power but it will be obvious of course that any other suitable form of gearing may be substituted without departing from the invention. So also the cylinder 15 constitutes a suitable

support for the bearings for said shafts 17, 18 and 19, said cylinder being adapted to be rocked during the rotation of the fans 20 by the means hereinafter described but it will be understood that any other suitable form of rocking member carrying bearings for said shafts may be substituted for the cylinder without departing from the invention. The cylinder 15 is provided at one end with a crank arm 30 which is connected by means of the link or pitman 31 with the crank pin 32 of a disk 33 geared to any suitable source of power to rotate the same, it being immaterial so far as the invention is concerned, whether the said disk 33 is rotatably-mounted on the casing of the machine as herein illustrated or is mounted externally of the same. It is also immaterial whether the rocking motion is imparted to the cylinder 15 by means of a disk, such as shown or whether said motion is otherwise imparted thereto. Above each of said respective shafts 17, 18, and 19, the upper wall of the casing 1 or suction chamber 3 is provided with an opening 34 closed by a suitable gate 35, the latter permitting access for the purpose of lubricating the bearings of said shafts and also serving to admit fresh air to the coating chamber 1 through the suction chamber 3 when desired or necessary as will hereinafter appear.

The respective dampers 6, 7, and 8 are operated from the exterior of the machine by means illustrated in Fig. 3. Each of said dampers is mounted at one end upon a shaft extending longitudinally of the casing 1 and journaled in the end walls thereof, the said dampers 6 being mounted upon a shaft 36 and said dampers 7 and 8 upon shafts 37 and 38 respectively. Mounted upon one end of the shaft 36 is a lever 39 equipped at one end with a crank 40 by means of which it may be rocked and is provided at its other end with a short arm 41. The latter is connected by means of a link 42 with the free end portion of the crank arm 43 mounted upon one end of the shaft 37. The shaft 37 at the other side of the machine is equipped with a bell crank lever 44, one arm of which is connected by means of a lever 45 with the crank arm 43 and the other arm of which is connected by means of a link 46 with the crank arm 47 on the shaft 36 opposite the first-named shafts 36. Thus movement imparted to the lever 39 is transferred to all the shafts 36 and 37 to simultaneously operate all of said dampers 6 and 7 to establish communication between the dust collectors 4 and the coating chamber 2. One of said shafts 38 carrying a damper 8 is equipped with a bell crank lever 48, one arm of which is connected with the rod 49 adapted to be manually operated to rock said shaft 38. The other arm of said bell crank lever 48 is connected by means of

a link 50 with the crank arm 51 secured to the other shaft 38 so that both of said shafts 38 will be actuated in unison as will be obvious.

5 The operation of the machine is as follows: After a truck loaded with articles to be coated has been inserted into the chamber 2 through one of the doors 11 and the latter has been closed, the several shafts 17, 18 and 10 19 are caused to rotate at high velocity or said shafts may be maintained continuously in rotation at high velocity. At this time the respective dampers 6, 7 and 8 will be closed as shown in full lines in Fig. 1. After 15 the door 11 through which the truck is admitted has been closed, the valve 14 controlling the supply of coating material to the chamber 2 is opened to deliver into said chamber a sufficient quantity of coating material to cover all of the surfaces of the contained articles to be coated. The air within 20 the coating chamber is maintained in violent motion by means of said fans 20 and the coating material introduced will be immediately distributed in a cloud and carried in suspension by the moving air currents and thus deposited upon the articles to be coated. The direction of projection of the air by the 25 fans 20 is being constantly varied by the oscillation of the cylinder 15 so that it not only rotates in opposite directions within the coating chamber but at intervals is projected vertically downwardly upon the floor of the coating chamber, there dividing itself 30 and passing up along either side wall thereof back to the suction chamber 3. By means of the glass covered openings 52 in the doors 11 the operator can readily determine when the articles have been completely 35 coated and thereupon the lever 39 is operated to open the dampers 6 and 7, throwing the latter to the respective positions indicated in dotted lines in Fig. 1. The said dampers 7 when in said position will obviously serve to deflect air currents passing 40 upwardly along the contiguous side wall of the chamber 2 into the dust-collecting chambers 4 and owing to the communication of the latter with the suction chamber 3 through the fabric 5, some of the air carrying 45 powder particles will be drawn back into the suction chamber 3 through said fabric and the coating material thus filtered from said air. Baffle plates 53 and 54 are interposed in said dust collecting chambers 4 in 50 the path of the air passing therethrough for well known reasons. Thus the air traveling through the coating chamber 1 will be quickly freed of unapplied powder particles and at the same time owing to the high velocity of the air currents, the same will serve 55 to remove from the coated articles all surplus non-adhering powder particles which may have become lodged upon any portion of the surfaces thereof. It may be desir-

able after having opened the said chambers 6 and 7 to also open one or more of the gates 35 to admit fresh air to the chamber 2, it being obvious however, that no more air will be admitted through said openings than sufficient to supply the needs of the chamber 2 70 and by reason of the location of said openings 34 the discharge of air through the same during the operation of the fans 20 is not probable. After the air in the chamber 2 has been completely freed of unapplied 75 powder particles, the truck with its load of coated articles is removed usually and preferably through the door at the opposite end of the chamber 2 from its point of admission. The fans may be maintained in rotation 80 while a truck load is being removed and during the interval of the admission to said chamber of a fresh truck load to be covered and upon closure of the doors and of the gates 35, if any one or all of the latter 85 should have been opened during the previous operation, the dampers 6 and 7 are closed. Before admitting a fresh supply of coating material from the receptacle, 12 it may be desirable to consume the unapplied powder particles contained in the trough-shaped dampers 8 and if so the latter may be primarily opened to discharge their contents into the coating chamber 2 and after 90 all or the greater part of said previously unapplied particles have been applied to the articles, any quantity necessary to completely coat the latter may be admitted by opening the said valve 14. The foregoing 95 operation is now repeated for successive batches of articles as will be obvious.

During the foregoing operations, the air in the apparatus becomes relatively very hot. It has been found in practice that 105 warm or relatively hot air is very advantageous for the reason that it quickly absorbs any slight degree of moisture it may contain in the coating powder at the time of admission and furthermore that it serves to 110 accelerate the hardening of the sizing during and subsequent to the coating operation. The said air becomes relatively saturated with the volatile constituent of the sizing and is thus rendered relatively poor in its 115 oxygen content so that its oxidizing effect upon the coating powder is greatly lessened which, in some instances, is decidedly advantageous. By maintaining the fans constantly in motion during the admission and 120 discharge of articles to be coated, a relatively very small quantity of fresh air is admitted to the coating chamber while either one or both of said doors 11 are opened and the temperature of the coating chamber is 125 then maintained relatively uniform as is also the character of the contained air.

In Fig. 5 I have illustrated a modified form of construction in which the shafts 55 carrying the fans 20 are journaled in bear- 130

ings in the top wall of the apparatus, said fans being disposed at a higher elevation than in the construction shown in Figs. 1 to 4 inclusive and projecting the air vertically only. The projected air is deflected so as to traverse the chamber alternately in opposite directions by means of a rocking deflector 56 mounted upon a shaft 57 journaled in bearings in the end walls of the apparatus and to which a rocking motion is imparted either manually or by power in any suitable manner such for example, as is employed in connection with the cylinder 15. In all other respects, the construction shown in Fig. 5 is substantially identical with that shown in Figs. 1 to 4 inclusive.

The coating material is introduced into the coating chamber 2 in measured quantities by means of the valve 14 interposed in the pipe 13, said valve being cylindrical and provided between its ends with a cup-shaped recess 58. The said valve is normally maintained in position to communicate with the receptacle 12 by means of a spring 59 in a well known manner and is turned through an arc of 180° by means of the arm 60 mounted upon the stem of said valve. The said recess 58 may be enlarged or reduced by means of the movable member 61 slidably mounted in said recess adjacent one end thereof and which is capable of adjustment by means of the screw 62 rotatably mounted in the plate 63 suitably secured to one end of said valve. It will be understood of course, that any other suitable form of construction of valve may be substituted for the foregoing, the latter being merely illustrative of a suitable embodiment of the invention.

I claim as my invention:

1. In a machine of the kind specified, a coating chamber having a concave bottom, means for supplying coating material thereto, means disposed in the upper end of said chamber for setting the air contained therein in motion to project the same upon said bottom, and means for varying the direction of projection of said air to cause the same to impinge alternately upon opposite side portions of said bottom.

2. In a machine of the kind specified, a coating chamber having a concave bottom, rails supported thereon extending parallel with the axis of said bottom, there being openings between the rail-tread and said bottom for the passage of air currents, means within said chamber for projecting the contained air to sweep the bottom thereof in a direction transverse to the said rails, and a coating material supply for said coating chamber.

3. In a machine of the kind specified, a coating chamber having a concave bottom, means for supplying coating material to said chamber, an air chamber above and

communicating with said coating chamber, means disposed in the mouth of said air chamber for projecting the air contained therein into and upon the bottom of said coating chamber, and means for varying the position of said air projecting means to vary the direction of projection of air currents upon said bottom of said coating chamber.

4. In a machine of the kind specified, a coating chamber having a concave bottom, means for supplying coating material thereto, means disposed in the upper end of said chamber for setting the air contained therein in motion to project the same upon said bottom, and automatically operable means for varying the direction of projection of said air to cause the same to impinge alternately upon opposite side portions of said bottom.

5. In a machine of the kind specified, a coating chamber having a concave bottom, rails supported thereon extending parallel with the axis of said bottom, there being openings between the rail-treads and said bottom for the passage of air currents, means for projecting air upon said bottom alternately at opposite sides of said rails and means for applying coating material to said coating chamber.

6. In a machine of the kind specified, a coating chamber, a dust-collecting chamber communicating therewith at its inlet and discharge ends, at least one damper controlling the connection of the inlet end of said dust-collecting chamber with said coating chamber, an air projecting means disposed within said coating chamber contiguous to the discharge end of said dust-collecting chamber and means for applying coating material to said coating chamber.

7. In a machine of the kind specified, a coating chamber, a dust-collecting chamber communicating therewith at its inlet and discharge ends, at least one damper controlling the connection of the inlet end of said dust-collecting chamber with said coating chamber, means within said coating chamber located contiguous to the discharge end of said dust-collecting chamber for creating air currents within said coating chamber, said damper when open adapted to deflect air currents to pass through said dust-collecting chamber and means for applying coating material to said coating chamber.

8. In a machine of the kind specified, a coating chamber, a suction chamber contiguous thereto, air projecting means disposed between said suction chamber and said coating chamber and adapted to project air from the former into the latter, means for oscillating said air projecting means for varying the direction of travel of the air currents, a dust-collecting chamber, a damper controlling the communication thereof at one end with said coating cham-

ber; the discharge end of said dust-collecting chamber communicating with said suction chamber and means for supplying coating material to said coating chamber.

9. In a machine of the kind specified, a coating chamber, a suction chamber contiguous thereto, air projecting means disposed between said suction chamber and said coating chamber and adapted to project air from the former into the latter, means for oscillating said air projecting means for varying the direction of travel of the air currents, a dust-collecting chamber, a damper controlling the communication thereof at one end with said coating chamber, the discharge end of said dust-collecting chamber communicating with said suction chamber, a filtering material interposed in the discharge end of said dust-collecting chamber and means for supplying coating material to said coating chamber.

10. A machine of the kind specified comprising a casing divided interiorly into a plurality of chambers, one thereof constituting the coating chamber, at least one other constituting a dust-collecting chamber, the latter communicating at its inlet and discharge ends respectively with said coating chamber, a damper controlling the inlet end of said dust-collecting chamber, means disposed contiguous to the discharge end of said dust-collecting chamber for creating air currents within said casing and means for supplying coating material to said coating chamber.

11. A machine of the kind specified comprising a casing divided interiorly into a plurality of chambers, one thereof constituting the coating chamber, at least one other constituting a dust-collecting chamber, the latter communicating at its inlet and discharge ends respectively with said coating chamber, a damper controlling the inlet end of said dust-collecting chamber, means disposed contiguous to the discharge end of said dust-collecting chamber for creating air currents within said casing, said damper when open adapted to deflect air currents to pass through said dust-collecting chamber and means for supplying coating material to said coating chamber.

12. A machine of the kind specified comprising a casing divided interiorly into a plurality of chambers, one thereof constituting the coating chamber, and two others constituting dust-collecting chambers disposed on opposite sides of the casing and having their discharge ends opposing each other, the portion of said coating chamber lying between said discharge ends of said dust-collecting chambers constituting a suction chamber, dampers controlling the communication of the inlet ends of said dust-collecting chambers with said coating chamber,

means interposed between said suction chamber and said coating chamber for projecting air currents into the latter and means for supplying coating material to said coating chamber.

13. A machine of the kind specified comprising a casing divided interiorly into a plurality of chambers, one thereof constituting the coating chamber, and two others constituting dust-collecting chambers disposed on opposite sides of the casing and having their discharge ends opposing each other, the portion of said coating chamber lying between said discharge ends of said dust-collecting chambers constituting a suction chamber, dampers controlling the communication of the inlet ends of said dust-collecting chambers with said coating chamber, means interposed between said suction chamber and said coating chamber for projecting air currents into the latter, said dampers when open serving to deflect air currents to pass through said dust-collecting chambers.

14. A machine of the kind specified comprising a casing divided interiorly into a plurality of chambers, one thereof constituting the coating chamber, and two others constituting dust-collecting chambers disposed on opposite sides of the casing and having their discharge ends opposing each other, the portion of said coating chamber lying between said discharge ends of said dust-collecting chambers constituting a suction chamber, dampers controlling the communication of the inlet ends of said dust-collecting chambers with said coating chamber, means disposed contiguous to the discharge ends of said dust-collecting chambers for creating air currents in said coating chamber, devices for oscillating said means for varying the direction of travel of air currents within said coating chamber and means for supplying coating material to said coating chamber.

15. A machine of the kind specified comprising a casing divided interiorly into a plurality of chambers, one thereof constituting the coating chamber and at least one other thereof constituting the dust collecting chamber communicating at its inlet and discharge ends with said coating chamber, a damper controlling the communication of said dust collecting chamber at its inlet end with said coating, means disposed contiguous to the discharge end of said dust collecting chamber for setting the air contained in said coating chamber in motion therein, the walls of said coating chamber being curved to guide air currents projected against the same to laterally traverse the bottom of said chamber, the inlet end of said dust collecting chamber being disposed in the path of air currents passing from the bottom to the

top of said coating chamber and means for supplying coating material to said coating chamber.

5 16. A machine of the kind specified, comprising a casing divided interiorly into a plurality of chambers, one thereof constituting the coating chamber, and two others constituting dust collecting chambers disposed on opposite sides of the casing and  
10 having their discharge ends opposing each other, the portion of said coating chamber lying between said discharge ends of said dust collecting chambers constituting a suction chamber, means interposed between  
15 said suction chamber and said coating chamber for projecting air currents into the latter, the walls of the coating chamber against which the air currents are projected being curved and adapted to guide and deflect the  
20 air currents to laterally traverse the lower portion of the chamber and pass upwardly toward said suction chamber, the inlet ends of said dust collecting chambers disposed in the path of the upwardly passing air currents, dampers controlling said inlet ends of  
25 said dust collecting chambers and means for supplying coating material to said coating chamber.

30 17. A machine of the kind specified, comprising a casing divided interiorly into a

plurality of chambers, one thereof constituting the coating chamber, and two others constituting dust collecting chambers disposed on opposite sides of the casing and having their discharge ends opposing each other, the portion of said coating chamber lying between said discharge ends of said dust collecting chambers constituting a suction chamber, means interposed between said suction chamber and said coating chamber for projecting air currents into the latter, means for oscillating said air projecting means to cause the projecting air currents to impinge alternately upon opposite side walls of said casing, the latter being curved and adapted to guide and deflect the air currents to laterally traverse the lower portion of the chamber and pass upwardly toward said suction chamber, the inlet ends of said dust collecting chambers disposed in the path of the upwardly passing air currents, dampers controlling said inlet ends of said dust collecting chambers and means for supplying coating material to said coating chamber.

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

RUDOLPH WM. LOTZ.

Witnesses:

A. M. WILSON,

T. K. BRYANT.