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APPARATUS FOR COATING OBJECTS WITH SUBDIVIDED MATERIAL.

APPLICATION FILED FEB. 11, 1910.

1,068,732. Patented July 29, 1913.

Fig. 1

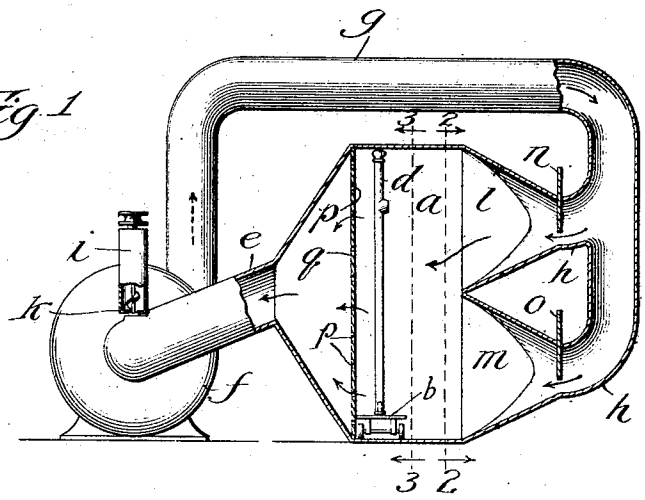


Fig. 2

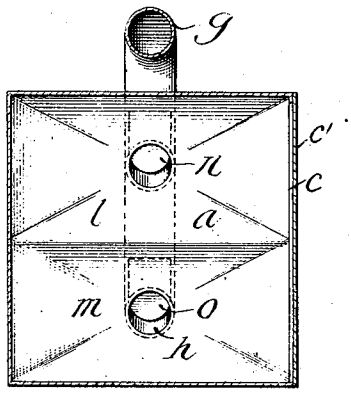
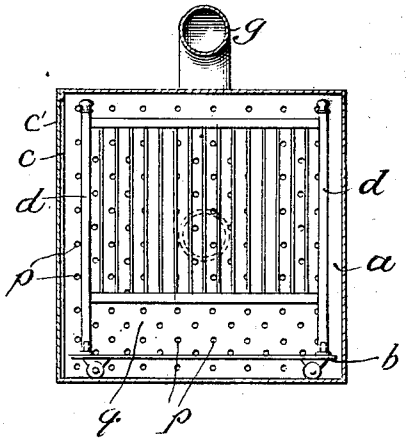


Fig. 3



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR COATING OBJECTS WITH SUBDIVIDED MATERIAL.

1,068,732. Specification of Letters Patent. Patented July 29, 1913.

Application filed February 11, 1910. Serial No. 543,215.

To all whom it may concern:

Be it known that I, FRANKLIN F. BRADLEY, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Apparatus for Coating Objects with Subdivided Material, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to apparatus for coating objects with comminuted, subdivided or powdered material and is of particular service in spreading bronze powder upon objects whose surfaces to be coated are covered or painted with suitable adhesive material or paint which in its fresh state holds the powder scattered thereupon and in its dry state firmly fixes the powder in place.

In practising my invention, I employ a receptacle for containing the object that is to be coated with the powdered material, a fan or blower for effecting forced circulation of air through the receptacle, piping which desirably includes the blower and receptacle in serial relation to establish a closed local path or circuit for the circulating air, though I do not wish to be limited to this way of practising my invention.

I provide means for altering the locality where the air has fullest flow for the purpose of modifying the direction of the air within the receptacle, to convey the material with which the air is laden to exposed parts of the object that are to receive the coating. In one embodiment of the invention the result last described is secured by means of moving elements such as valves to permit the opening and closing of a number of openings preferably located in a wall of the receptacle, whereby the locality where air is initially impressed upon air within the receptacle is changed.

The powder is admitted to the flowing air preferably through the piping. As my invention is preferably practised, the air is desirably received into the receptacle through multipled discharge openings or terminals of the piping, alternately at first to cause the powder laden air to swirl and thereby carry the powder to all exposed surfaces of the object in addition to the surfaces directly facing the air entrances. The air is desirably also caused to leave the receptacle through a plurality of exit openings that are distributed over an area substantially coextensive with the largest area to be coated with the powder, to insure the access of the powder to the largest surface that may be exposed thereto. In the preferred embodiment of the invention, the aggregate area of the air exit openings does not exceed the area in right cross section of the piping conveying the air from the receptacle, so that the powder laden air is forced to seek all that space within the receptacle where the objects to be coated with powder are properly located. In the preferred embodiment of the invention, the exit openings are afforded by means of a screen or perforated plate located in front of the exit portion of the pipe and in which screen the openings are distributed over the desired area.

I will explain my invention more fully by reference to the accompanying drawing showing the preferred embodiment thereof and in which—

Figure 1 is an elevation, partly in section, of such preferred embodiment; Fig. 2 is a sectional view in the direction of arrows 2 2 in Fig. 1; and Fig. 3 is a sectional view in the direction of arrows 3 3 in Fig. 1.

Like parts are indicated by similar characters of reference throughout the different figures.

The receptacle *a* is shaped suitably to the objects to be received therein, the construction illustrated being well adapted to receive metal bedstead parts that are moved into and out of the receptacle upon a truck *b* through a doorway *c*, a bedstead part *d* being illustrated within the receptacle. The doorway constitutes an opening through which the objects to be coated may be passed into the receptacle interior in position to enable the air to be circulated around and toward the objects, and the door *c'* constitutes a closure for said opening for preventing escape of material laden air therethrough while the objects are being coated. A section *e* of suitable piping leads from the air exit side of the receptacle to a power driven fan or blower *f*, the complemental section *g* of the piping leading from the blower to the air entrance side of the receptacle located opposite the air exit side, the pipe section *g* having multipled branches *h* affording multipled discharge openings through which air is admitted to the interior of the receptacle.

The multipled branches *h* afford the preferred means by which the air is permitted to enter the receptacle so as successively to follow different paths, whereby the desired swirling movement of the powder laden air is secured. The powdered or subdivided material, such as bronze powder, is admitted to the piping, preferably through an upright conduit *i*, said conduit inclosing a power driven feeding worm *k* for forcing the powder through an opening at the bottom of the conduit which establishes communication between the interiors of the piping and the conduit. The object to be coated is located in substantial alinement with the entrance and exit openings.

The powder is thoroughly and evenly distributed throughout the flowing column of air in the piping and is conveyed by the moving air to the multipled discharge ends *l m* of the piping that may be located in vertical alinement. These multipled pipe ends flare toward the interior of the receptacle *a*, valves *n o* being located in the throat portions of said pipe ends. By manipulation of these valves, the powder laden air may be caused to pass entirely through each of the discharge ends in succession, whereby the place where the air enters the receptacle is changed with respect to the object to be coated and the air is preferably caused rapidly to swirl within the receptacle so that it may carry the powder not only to those surfaces of the structure *d* that are immediately in front of the discharge openings, but to all other exposed surfaces of said object as well, including those at the top, bottom, ends and backs of said structure. By the mechanism described, the locality where air is initially impressed upon air within the receptacle is changed for the purpose stated. The swirling of the air within the receptacle is promoted by the flaring ends of the multipled air discharge terminals *l m*. It is of course understood that all those surfaces of the structure *d* that are to retain the powder are coated or painted with a suitable material or paint, which, in its wet state, holds the powder, and thereafter in its dry state, prevents its dislodgment. Further to insure the carriage of the powder to all surfaces upon which it is to be lodged, and to improve the swirling action of the air for this purpose I also multiple the air exit openings and distribute them over an area that preferably exceeds the largest opposed surface upon the structure *d* that is to receive the powder. These multipled air exit or discharge openings are desirably constituted of the perforations *p* in a screen plate *q* preferably constituting a wall of the receptacle *a*. The aggregate area of these screen openings is preferably not greater than the area of a right cross section through the portion of the pipe *e* that is uniform in diameter, the escaping air passing through all of the openings *p* in seeking paths of least resistance. The end of the pipe section *e* adjacent to the screen *q* flares toward said screen and embraces its borders. The entire structure is such that the air is caused to flow in a general movement and in varying eddies and minor currents.

The structure *d* may remain in the receptacle more than a sufficient length of time required to coat it with the powder, as the adhesive material will only hold what powder is properly required to coat the structure. The powder that does not adhere to the structure *d* continues to circulate through the closed air circuit which has been described as long as the fan or blower remains in action, and the amount which becomes lodged upon said structure is replenished at *i*. A slight excess of powder may remain upon the structure *d* after its removal from the receptacle and which is of course dislodged as by a brush.

I have herein shown and particularly described the preferred embodiment of my invention, to which, however, I do not wish to be limited, as changes may readily be made without departing from the spirit of my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent the following:—

1. Apparatus for coating objects with subdivided material carried by air, including a receptacle for the objects; mechanism for forcing passage of air within the receptacle, there being an element having a plurality of openings in communication with the receptacle interior and through which the air is forced; and mechanism for permitting and cutting off flow of air through said openings to cause the direction of the air to be changed within the receptacle, there being also a plurality of distributed openings supplied in addition to the aforesaid openings and affording communication between the exterior of the receptacle and its interior and located to have the object to be coated placed between the same and the first aforesaid openings, said second set of openings causing spreading of the material laden air, the air in being spread and having its direction changed carrying the material with which it is laden to the surfaces of the object that are to be coated therewith.

2. Apparatus for coating objects with subdivided material, carried by air, including a receptacle for the objects; mechanism for forcing passage of air within the receptacle, there being an element through which the air is forced; and mechanism whereby the locality where the air has fullest flow between said element and receptacle may be

changed thereby to cause the direction of the air to be changed within the receptacle, there being also a plurality of openings affording communication between the exterior of the receptacle and its interior and located to have the object to be coated placed between the same and the locality where the aforesaid element has communication with the receptacle interior, said plurality of openings causing spreading of the material laden air, the air in being spread and having its direction changed carrying the material with which it is laden to the surfaces of the object that are to be coated therewith.

3. Apparatus for coating objects with subdivided material carried by air, including a receptacle for the objects; mechanism for forcing passage of air within the receptacle, there being an element having a plurality of openings in communication with the receptacle interior and through which the air is forced; and mechanism for permitting and cutting off flow of air through said openings to cause the direction of the air to be changed within the receptacle to convey the material with which the air is laden to exposed parts of the object that are to receive the coating.

4. Apparatus for coating objects with subdivided material carried by air, including a receptacle for the objects; mechanism for forcing passage of air within the receptacle; and mechanism whereby the locality where the air has fullest flow may be changed thereby to cause the direction of the air to be changed within the receptacle to convey the material with which the air is laden to exposed parts of the object that are to receive the coating.

5. Apparatus for coating objects with subdivided material carried by air, including a receptacle having entrance and exit openings for the air between which the object to be coated may be placed in substantial alinement therewith; mechanism for effecting forced passage of air through said openings and the interior of the receptacle; and mechanism for effecting relative change between the object to be coated and a locality where air finds passage between the interior and exterior of the receptacle whereby the direction of air with respect to said object is changed to enable the material with which the air is laden to be carried to exposed parts of the object that are to be coated therewith.

6. Apparatus for coating objects with subdivided material carried by air, including a receptacle for the object having two localities for establishing communication between the receptacle interior and exterior and between which localities the object to be coated may be placed, the structure at these localities causing the air to spread at one locality as compared with the area through which the air finds passage between the receptacle interior and exterior at the other locality, and mechanism for forcing the passage of material laden air through the receptacle from one of said localities to the other.

7. Apparatus for coating objects with subdivided material carried by air, including a receptacle for the objects; mechanism for forcing passage of air within the receptacle, there being an element through which the air is forced; and mechanism whereby the locality where the air has fullest flow between said element and receptacle may be changed thereby to cause the direction of the air to be changed within the receptacle to convey the material with which the air is laden to exposed parts of the object that are to receive the coating.

8. Apparatus for coating objects with subdivided material carrier by air, including a receptacle for the objects; mechanism for forcing passage of air within the receptacle, and mechanism whereby the locality where air is initially impressed upon air within the receptacle is changed, thereby to cause the direction of the air to be changed within the receptacle to convey the material with which the air is laden to exposed parts of the object that are to receive the coating, the receptacle having an opening through which the objects to be coated may be passed into the receptacle interior in position to enable the air to be circulated around and toward the objects and a closure for said opening for preventing escape of material laden air therethrough while the objects are being coated.

9. Apparatus for coating objects with subdivided material carried by air, including a receptacle having an opening through which the objects to be coated may be passed into the receptacle interior in position to enable the air to be circulated around and toward the objects and a closure for said opening for preventing escape of material laden air therethrough while the objects are being coated; and mechanism for causing the material laden air to be directed around and toward the objects in a general movement and in eddies and minor currents to convey the material with which the air is laden to exposed parts of the objects that are to receive the coating.

10. Apparatus for coating objects with subdivided material carried by air, including a receptacle for the objects; mechanism for forcing passage of air within the receptacle; and mechanism whereby the locality where the air has fullest flow may be changed thereby to cause the direction of the air to be changed within the receptacle to convey the material with which the air is laden to exposed parts of the object that are to receive the coating, the receptacle having an

opening through which the objects to be coated may be passed into the receptacle interior in position to enable the air to be circulated around and toward the objects and a closure for said opening for preventing escape of material laden air therethrough while the objects are being coated.

11. A machine of the kind specified, comprising a closed chamber for holding a body of air laden with coating material and adapted to receive articles to be coated, means for creating air currents in said chamber, and means for varying the direction of travel of said air currents.

12. A machine of the kind specified, comprising a closed chamber for holding a body of air laden with coating material and adapted to receive articles to be coated, means for creating air currents in said chamber, and means for varying the direction of travel of said air currents relatively to the article to be coated to cause the same to impinge upon oppositely disposed surfaces thereof.

In witness whereof, I hereunto subscribe my name this eighth day of February, A. D. 1910.

FRANKLIN F. BRADLEY.

Witnesses:
G. L. CRAGG,
R. E. ATHERTON.