May 6, 1952 M. M. DARLEY 2,596,011

DUST GUN

Filed July 17, 1948 2 SHEETS—SHEET 1

FIG.3.

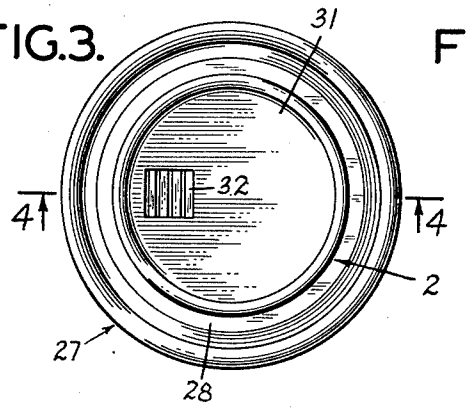


FIG.5.

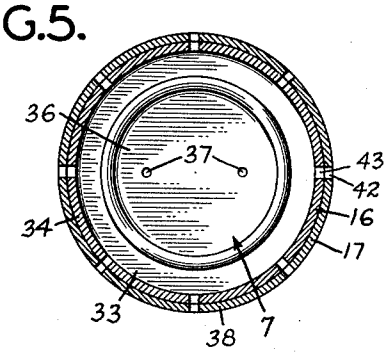


FIG.4.

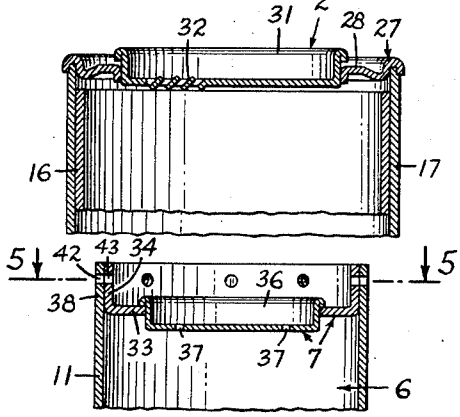
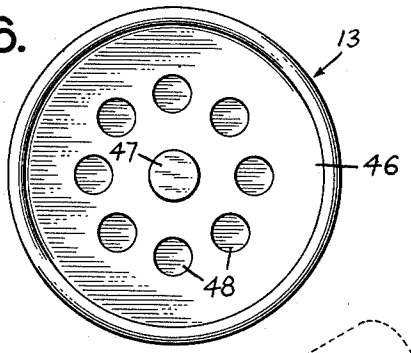


FIG.6.



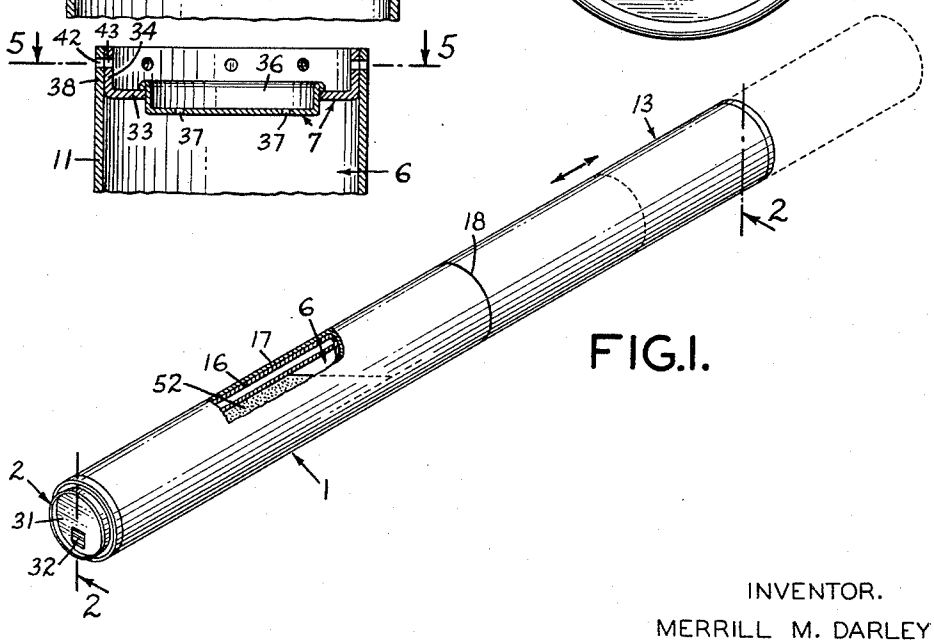


FIG.1.

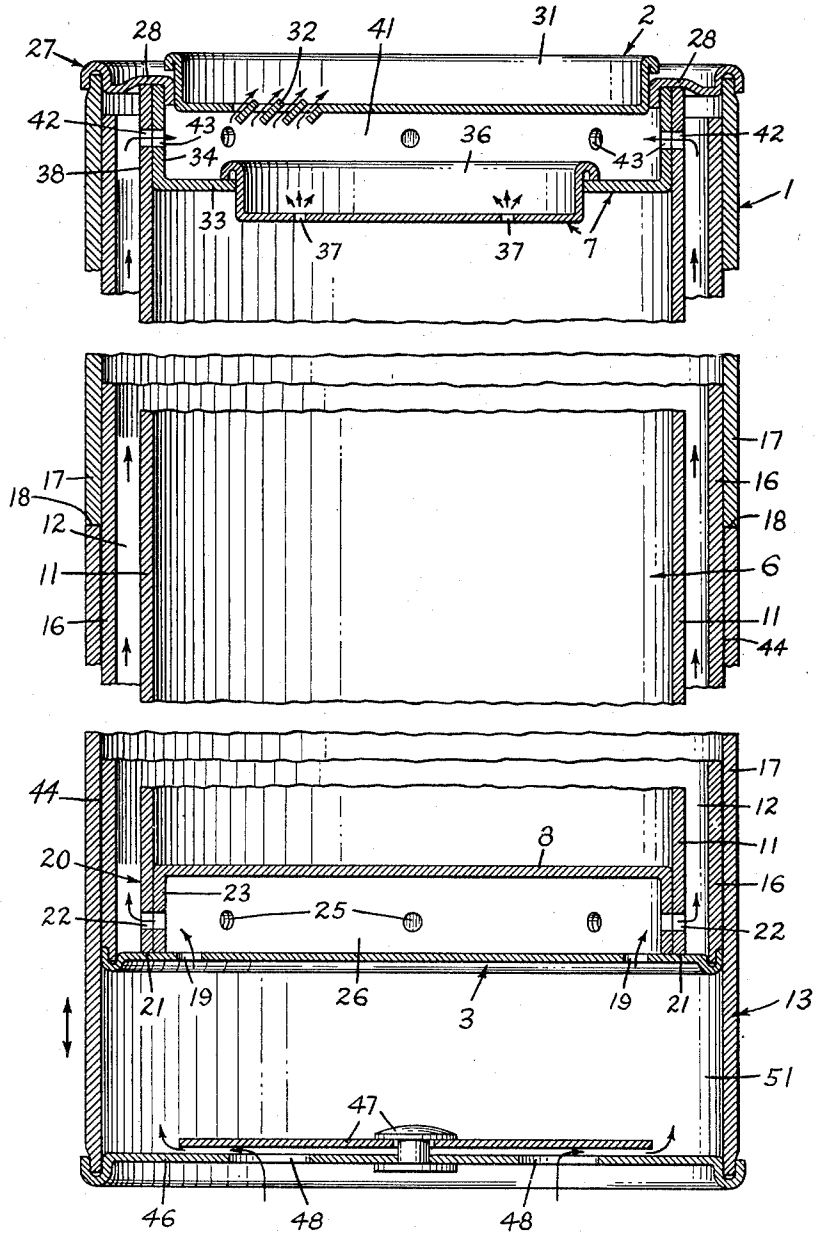
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DUST GUN

Filed July 17, 1948 2 SHEETS—SHEET 2

FIG. 2.



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Patented May 6, 1952

2,596,011

UNITED STATES PATENT OFFICE

2,596,011

DUST GUN

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Application July 17, 1948, Serial No. 39,232

7 Claims. (Cl. 43—147)

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This invention relates to an improved dust spray dispenser, and in particular to a combination package and dispenser especially adapted for domestic spraying of parasiticides in dust form.

The objects and advantages of the invention will be apparent from the following description of a preferred embodiment illustrated in the accompanying drawings in which:

Figure 1 is an isometric view of my dust spray dispenser shown in the slightly downwardly inclined position in which the spray gun is normally held when in use;

Figure 2 is a longitudinal section in large scale taken along line 2—2 of Figure 1;

Figure 3 is a plan view of the air-dust discharge end of the dispenser;

Figure 4 is a longitudinal section of the discharge end of the spray gun taken along line 4—4 of Figure 3, showing a portion of the external housing broken away and shown apart from the internal part of the dispenser;

Figure 5 is a transverse section taken along line 5—5 of Figure 4; and

Figure 6 is a plan view of the dispenser as seen from the bottom of Figure 2.

In the position in which the dispenser is shown in Figure 2, the air-dust discharge end is directed upwardly and the compression or air inlet end is directed downwardly. Accordingly, for the purpose of clarity the discharge end in the specification and claims hereinafter will be referred to as the top end, and the air inlet end as the bottom end.

The preferred dust spray dispenser as shown particularly in Fig. 2 comprises housing member 1 having a top end closure 2 and bottom end closure 3. Disposed within the housing is dust container 6 which comprises top end closure 7 and air-impervious bottom end closure 8. Side wall 11 of dust container 6, which terminates at top end closure 7 and bottom end closure 8, is also air-impervious and is preferably made of a resilient material such as paper board. Its outside periphery or diameter is appreciably smaller than the inside periphery or diameter of housing 1 thus forming an annular passage 12 to facilitate flow of air longitudinally along the outside of said container side wall. Compression member 13 is telescopically associated with the bottom end of housing member 1.

Housing member 1, preferably of rigid paper board construction and of cylindrical shape, comprises inner cylindrical member 16 and outer cylindrical member 17 fixedly attached thereto and forming a hand grip portion. Inner member 16

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extends downwardly substantially farther than the outer member 17, the lower circumferential edge of which abuts the upper circumferential edge of telescoping compression member 13 at joint 18 when member 13 is in the closed position as shown in full lines in Fig. 1.

Housing bottom end closure 3 is preferably of sheet metal construction, crimped at its outer edge to inner cylindrical member 16, and contains a plurality (e. g. five or six) of air passage openings 19 circumferentially spaced apart and positioned about as shown in Fig. 2. Bottom cylindrical collar or diaphragm 20 is attached, preferably integrally as shown, to the lower end of air-impervious side wall 11 of container 6, said diaphragm evenly abutting housing bottom end closure 3 at 21. Thru collar 20 pass apertures 22 which are in size and number suitable to produce restricted flow of air into annular passage 12. Depending flange 23 is attached, preferably integrally as shown, to bottom closure 8. Said flange 23 is fixedly attached to collar 20 and is provided with apertures 25 equal in size and number to and aligned with the corresponding apertures 22. Thus, bottom end closures 3 and 8, flange 23 and collar 20 form an air distributing chamber 26 which serves to receive air transmitted thru openings 19 and to distribute such air into annular passage 12, apertures 22 and 25 in collar 20 and flange 23 being the only means of communication between said chamber and said passage.

Housing top end closure 2, preferably constructed of sheet metal, comprises an annulus 27 having a downwardly facing channel 28 and crimped at its outer edge to outer cylindrical member 17, and a removable tight-fitting friction cover or plug 31 which has apertures therethru, preferably a louver as shown at 32. The baffles of the louver are preferably set on an angle to direct the stream of dust-air mixture in a general upward direction when the discharge end of the gun is held slightly lowered and the louver is positioned as in Fig. 1.

Dust container top end closure 7 comprises annulus 33 and a removable tight-fitting plug 36 having apertures 37 which are in size and number suitable for the passage of dust from the interior of container 6. Cylindrical collar or diaphragm 38 is attached, preferably integrally as shown, to the top end of air-impervious side wall 11 of container 6, said collar evenly and firmly abutting housing closure 2 in the downwardly facing channel 28 of annulus 27 thereby supporting the top of the container in the approximate center of the

housing. Upstanding flange 34 is attached, preferably integrally as shown, to the top closure 7, said flange being fastened, in turn, to collar 38 to hold closure 7 in place and seal dust container 6. Top collar 38, flange 34 and spaced apart end closures 2 and 7 form air-dust mixing and distributing chamber 41. Top collar 38 has a plurality of circular apertures 42, which, in conjunction with corresponding aligned openings 43 in flange 34, form the only means by which air may enter air-dust mixing chamber 41 from annular passage 12. Apertures 42 and 43 in collar 38 and flange 34 are uniform in size, evenly spaced around collar 38 to direct substantially uniform jets of air into chamber 41 in a substantially radial direction and are preferably in number and size the same as apertures 22 and 25 in bottom collar 20 and flange 23. The total area of the openings of louver 32 is preferably many times larger than the total area of apertures 37, and the louver openings are of size suitable to permit air-dust mixture to be sprayed from chamber 41. Plug 36 is of size suitable upon removal thereof to permit charging of powder to container 6. Plug 31 is preferably larger than plug 36 and adapted by removal thereof to permit removal of plug 36 and thereby permit access to the interior of container 6. Both plugs 31 and 36 are preferably oval or circular in shape.

Telescoping compression member 13, preferably constructed of rigid paper board, normally evenly abuts outer cylindrical member 17 of housing 1 at joint 18 but is freely slidable along inner cylindrical member 16 at surface 44. When the two said members are abutting at 18 a relatively smooth surface appears from the outside of the spray dispenser. Paper, tape, or other similar severable material not shown may be pasted or otherwise fastened over joint 18 to hold the two members in detachable contact during shipping and handling. Bottom end closure 46 of telescoping compression member 13 is preferably constructed of metal, and is crimped at its outer edge to the cylindrical portion of the compression member. Check valve means 47 associated with closure 46 restricts flow of air thru apertures 48 to uni-directional flow into compression zone 51.

During shipment, handling or storage of my improved dispenser, escape of dust from container 6 may be prevented by merely placing pressure-sensitive tape or other readily removable sealing means over apertures 37 and/or louvers 32. With these apertures constricted, there is no possibility of dust leaking out. However, even when no sealing means are covering these apertures, the tendency for dust to escape when the dispenser is not in use is very slight, because apertures 37 are quite small and are the only means of egress of dust from the container.

Although the dimensions of the apparatus are not limited to any particular values but may vary with the fineness of the material to be sprayed, the desired intensity of application of the dust, the amount thereof desired to be held in the container, etc. and may be those values which will produce the desired function as heretofore described, I find that satisfactory operation is obtained from a dust spray dispenser having the following dimensions: Housing inside diameter = approximately 2¼ inches, width of annular passage 12 = approximately 1/16 to ⅛ of an inch, distance between the flat portions of plugs 31 and 36 = approximately ⅜ of an inch. The top and bottom collars may each contain 8 apertures of approximately 0.086 to 0.093 inch diameter. The

housing top end plug 31 may have a four-blade louver placed substantially off-center of the plug and adjacent the rim thereof. The louver may be about ⅜ inches square, and is constructed preferably so that the plane of each louver blade intersects at an angle of about 45 degrees, both the surface of plug 31 and the longitudinal axis of the dispenser as extended above the plug. The dust container top end plug 36 may have two apertures of approximately 0.052 to 0.055 inch diameter evenly spaced from the center of the plug as shown in Fig. 5. These dimensions have been found to be suitable for dispensing a dust 99% of which will pass dry thru a 40 mesh screen without brushing, and the remaining 1% with only light brushing, and 100% of which will pass dry thru a 20 mesh screen without brushing. However, my invention is not limited to particular dimensions nor to apparatus for dispensing particular types of dust.

My preferred spray dispenser heretofore described is operated as follows:

Tape or other material sealing louver 32 and apertures 37 is removed. After inserting a knife in joint 18 to free compression member 13 from housing 1 as previously described, the top of the dispenser as shown in Fig. 2 is held in a lowered position as shown in Fig. 1. In this position, powder 52 shifts to the discharge end of container 6 and rests against apertures 37. Telescoping compression member 13 is moved in a reciprocating manner along surface 44 whereby a pumping action of air is obtained and intermittent flow of air thru apertures 48 into compression chamber 51 and thru apertures 19 into air distributing chamber 26 is obtained. Air thence flows radially thru restricting apertures 25 and 22, longitudinally thru annular passage 12 and radially inwardly thru apertures 42 and 43 in jets into air-dust mixing chamber 41. It will be noted that the entire stream of air is directed around dust container 6 i. e., thru annular passage 12, and that there is no air flow directly thru the container. This is a particularly advantageous feature of my dust spray dispenser as more fully explained below. Dust to be sprayed emerges from container 6 thru apertures 37 in plug 36 into air-dust mixing chamber 41 and mixes with the previously mentioned air stream. The turbulence caused by the jets of air introduced into chamber 41 effects thorough whirling and mixing of dust with air whereupon the air-dust mixture is ejected thru louver 32 in a strong stream and may be directed toward the subject to be treated with the dust.

The flow of dust thru apertures 37 is ordinarily induced by several factors. Housing 1 and telescoping member 13 are of rigid construction and may not be distorted by hand pressure. However, container 6 is preferably thin walled and made of compressed paper light enough to be resilient and to permit substantial distortion by ordinary hand-grip pressure. Hence, since rate of air flow thru the gun is substantially restricted by the size of apertures 25, 22, 42 and 43, on the compression stroke of telescoping member 13 air from the compression chamber 51 builds up a substantial pressure in annular space 12 thereby substantially compressing the resilient wall of container 6 and tending to squeeze out dust thru apertures 37. Second, in use the discharge end of the dispenser is ordinarily held lower than the compression end, dust in the container therefore rests against plug 36, and gravity tends to induce discharge of dust thru apertures 37. Further, since total area of the louver openings is many

times the total area of container orifices 37, the natural path of air under compression is out thru the louver openings. Hence, the jets of air directed into chamber 41 thru apertures 42 and 43 create an aspirating action which draws dust thru apertures 37 into chamber 41. Moreover, the angularity and off-center positioning of the louver blades effects an abrupt change of direction of the outgoing air and dust, thereby promoting good mixing, and facilitates formation of a spray which by axial turning of the gun, may be directed against the underside, side or top of the vegetation being sprayed. The combination of the foregoing factors and the absence of direct air flow thru the dust container produces even flow of dust from the container while pumping is in progress and creates a well dispersed spray. Further, there is substantially no "dribbling" of dust from the container when there is no pumping action and the dispenser is held with its discharge end in a lowered position.

When it is desired to refill container 6, plugs 31 and 36 are removed and the dust introduced directly into the container thru the large apertures in closures 2 and 7. When the desired amount of dust has been thus introduced the plugs 31 and 36 are replaced. The dispenser is then ready to be used for further spraying operations.

I claim:

1. A dust spray dispenser comprising a housing, a dust container rigidly mounted in said housing and including air-impervious side walls and an air-impervious bottom end closure, the outside periphery of said container being appreciably smaller than the inside periphery of said housing to thereby form an annular-like passage to facilitate flow of air longitudinally along the outside of said container side walls; there being an air-dust mixing and distributing chamber in said housing disposed above said container and communicating with said container by a dust aperture, with the atmosphere by an air-dust spray aperture, and by a plurality of peripherally spaced-apart air flow distributing apertures with the upper end of said passage; an air distributing chamber below said container and communicating by a plurality of peripherally spaced-apart air flow distributing apertures with the lower end of said passage; and means associated with the lower end of the housing for supplying air under compression to said air distributing chamber.

2. A dust spray dispenser comprising a housing, a dust container rigidly mounted in said housing and including air-impervious side walls and an air-impervious bottom end closure, the outside periphery of said container being appreciably smaller than the inside periphery of said housing to thereby form an annular passage to facilitate flow of air longitudinally along the outside of said container side walls; there being an air-dust mixing and distributing chamber in said housing disposed above said container and communicating with said container by a dust aperture, with the atmosphere by an air-dust spray aperture, and with the upper end of said passage by a plurality of apertures formed to direct jets of air into said mixing and distributing chamber in streams lying in a plane disposed at substantially a right angle to the axis of said container, and means associated with the lower end of the housing for intermittently supplying air under compression to said passage.

3. A dust spray dispenser comprising a cylindrical housing, a cylindrical dust container rigidly mounted in said housing and including air-impervious side walls and an air-impervious bottom end closure, the outside diameter of said container being appreciably smaller than the inside diameter of said housing to thereby form an annular passage to facilitate flow of air longitudinally along the outside of said container side walls; means including a cylindrical wall having an outside diameter appreciably smaller than the inside diameter of said housing forming an air-dust mixing and distributing chamber in said housing disposed above said container and communicating with said container by a dust aperture, with the atmosphere by an air-dust spray aperture, and with the upper end of said passage by a plurality of apertures of substantially uniform size disposed around the periphery of said chamber wall and adapted to direct substantially uniform jets of air radially into said air-dust mixing chamber, and means associated with the lower end of the housing for supplying air under compression to said passage.

4. The combination, in a dust spray dispenser, of a cylindrical housing having a bottom end closure and a top end closure; a dust container disposed within said housing and comprising a top end closure, a cylindrical air-impervious side wall, and an air-impervious bottom end closure, the outside diameter of said container being appreciably smaller than the inside diameter of said housing to thereby form an annular passage to facilitate flow of air longitudinally along the outside of said container side wall; said housing bottom end closure having an opening therethru, said container bottom end closure being spaced apart from said housing bottom end closure, means including said spaced apart bottom end closures forming an air distributing chamber communicating with the bottom end of said annular passage; said container top end closure being spaced apart from said housing top end closure, means including a diaphragm which contains air flow distributing apertures and said spaced apart top end closures forming an air-dust mixing and distributing chamber communicating only by means of said diaphragm apertures with the top of said annular passage, said container top end closure having an aperture for passage of dust to be sprayed into said air-dust chamber, and said housing top end closure having an aperture substantially larger than said container closure aperture for the passage of the air-dust mixture to be sprayed, means including said diaphragm and said housing top end closure for rigidly mounting said dust container within said housing; and a valved cylindrical compression member telescopically associated with said housing and adapted to supply air under compression to said air distributing chamber.

5. A dust spray dispenser comprising a housing, a dust container rigidly mounted in said housing and including air-impervious side walls and an air-impervious bottom end closure, the outside periphery of said container being appreciably smaller than the inside periphery of said housing to thereby form an annular-like passage to facilitate flow of air longitudinally along the outside of said container side walls; there being an air-dust mixing and distributing chamber in said housing disposed above said container and communicating with said container by a dust aperture, with the atmosphere by an air-dust spray aperture, and with the upper end of said

passage by a plurality of air flow distributing apertures, and means associated with the lower end of the housing for supplying air under compression to said passage.

6. The combination, in a dust spray dispenser, of a cylindrical housing having a bottom end closure and a top end closure; a dust container disposed within said housing and comprising a top end closure, a cylindrical air-impervious side wall, and an air-impervious bottom end closure, the outside diameter of said container being appreciably smaller than the inside diameter of said housing to thereby form an annular passage to facilitate flow of air longitudinally along the outside of said container side wall; said housing bottom end closure having an opening therethru, said container wall being integrally attached to a cylindrical bottom collar extended downwardly beyond said container bottom end closure, said collar evenly abutting said housing bottom end closure and having an air flow restricting aperture, said bottom collar and said spaced apart bottom end closures forming an air distributing chamber communicating only by means of said aperture in said bottom collar with the bottom end of said annular passage; said container wall being integrally attached to a cylindrical top collar extended upwardly beyond said container top end closure, said top collar evenly abutting said housing top end closure and having a plurality of air flow distributing apertures, said top collar and said spaced apart top end closures forming an air-dust mixing and distributing chamber communicating only by means of said apertures in said top collar with the top of said annular passage; said container top end closure having an aperture for passage of dust to be sprayed into said air-dust chamber, and said housing top end closure containing an aperture substantially larger than said container closure aperture for the passage of the air-dust mixture to be sprayed, means including said collars and said top and bottom housing closures for rigidly mounting said dust container within said housing; and a valved cylindrical compression member telescopically associated with the bottom portion of said housing and adapted by longitudinal reciprocating movement thereof to force air thru said housing bottom closure opening and thereby supply air under compression to said air distributing chamber.

7. A combination package and dust spray dispenser comprising a cylindrical housing having a bottom end closure and having a top end closure comprising an annulus and a removable plug; a dust container disposed within said housing and comprising a top end closure, a cylindrical air-impervious side wall, and an air-impervious bottom end closure, the outside diameter of said container being appreciably smaller than the inside diameter of said housing to thereby form an annular passage to facilitate flow of air longitudinally along the outside of said container side wall; said housing bottom end closure having a plurality of openings therethru, said container wall being integrally attached to a cylindrical bottom collar extended downwardly beyond said container bottom end closure, said collar evenly abutting said housing bottom end closure and having a plurality of air flow distributing apertures, said bottom collar and said spaced apart bottom end closures forming an air distributing chamber communicating only by means of said apertures in said bottom collar with the bottom end of said annular passage; said container wall being integrally attached to a cylindrical top collar extended upwardly beyond said container top end closure, said top collar evenly abutting said housing closure annulus and having a plurality of air flow distributing apertures, said top collar and said spaced apart top end closures forming an air-dust mixing and distributing chamber communicating only by means of said apertures in said top collar with the top of said annular passage; said container top end closure comprising an annulus and a removable plug containing apertures for passage of dust to be sprayed into said air-dust chamber, said housing closure plug being substantially larger than said container plug and being adapted by removal thereof to permit removal of said container plug and to thereby permit access to the interior of said container, said housing plug containing apertures substantially larger than said container plug apertures for the passage of the air-dust mixture to be sprayed, means including said collars and said top and bottom housing closures for rigidly mounting said dust container within said housing; and a valved cylindrical compression member telescopically associated with the bottom portion of said housing and adapted by longitudinal reciprocating movement thereof to force air intermittently thru said housing bottom closure openings and thereby supply air under compression intermittently to said air distributing chamber and said annular passage.

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