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VALVE FOR CONTAINERS

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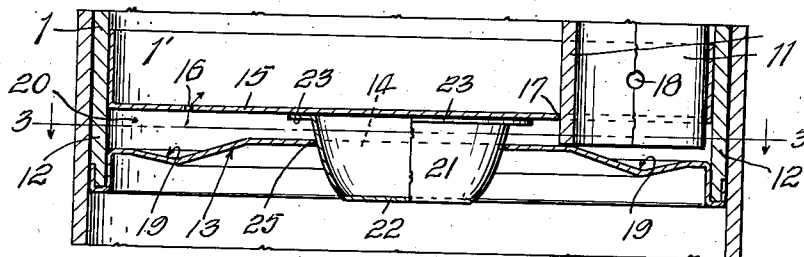


Fig. 1.

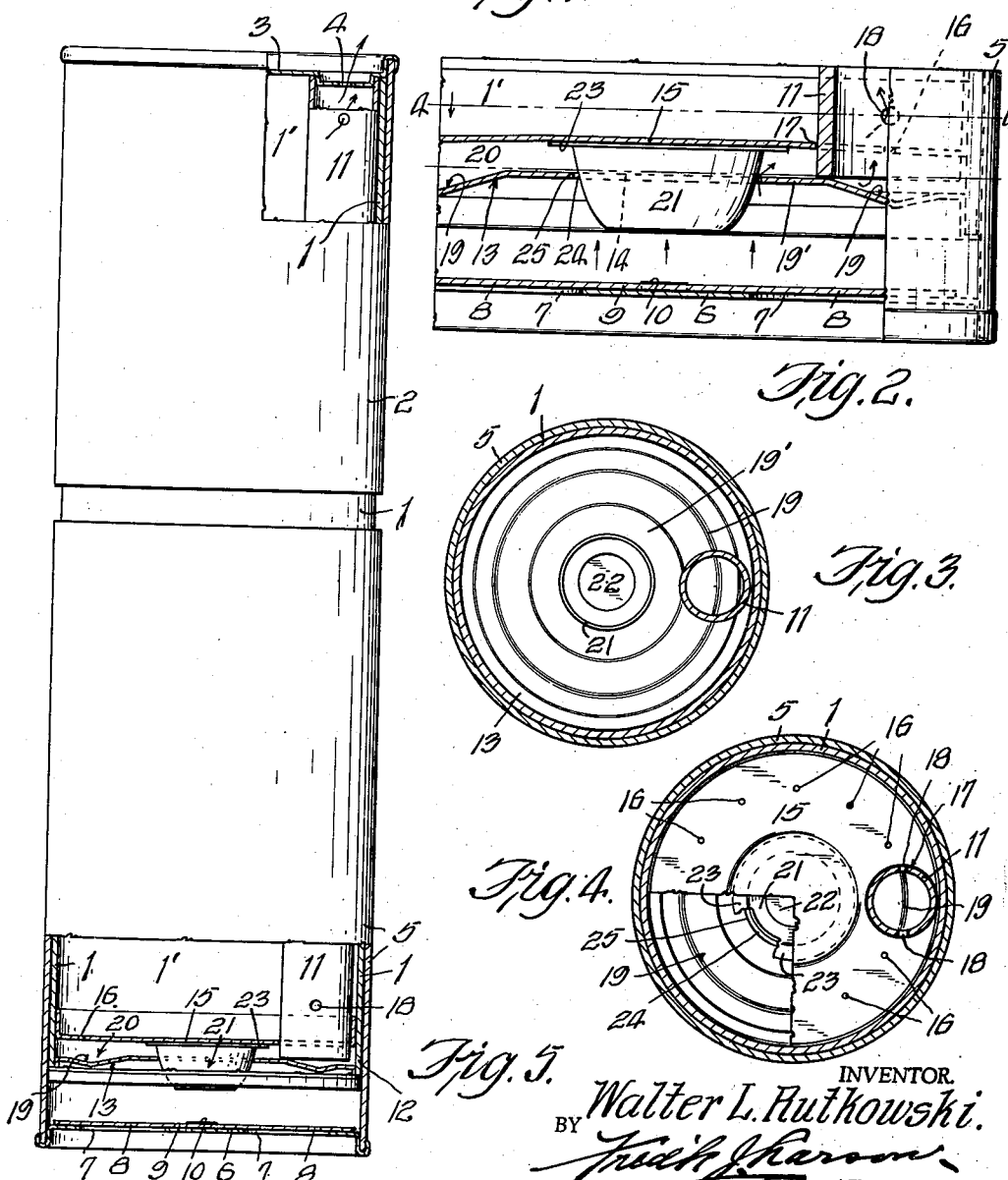


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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VALVE FOR CONTAINERS

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7 Claims. (Cl. 43—147)

My invention relates to combined powder containers and distributors, such as disclosed in applications bearing Serial Numbers 130,826 and 275,960, now Patent Nos. 2,122,230 and 2,215,937 of June 25, 1938, and September 24, 1940, respectively and refers more particularly to a check valve structure for such devices.

In powder containers and distributors designed as a unit for both packaging and spraying insecticides and the like in dry, or powdered form, it is necessary to employ, as a part of the structure, a valve equipped plunger element to cause the powder within a container with which the plunger element has telescopic connection, to be emitted in the form of a spray mixed with air under pressure.

To accomplish this in a desired and efficient manner, reciprocating movement of the plunger element allows the entrance of air between the plunger element and the powder container during the compression stroke of the plunger element, and will prevent the admission of air between the powder during the opposite stroke of the plunger element, thus emitting powder in the form of a spray from the device.

It is very desirable that the mixture of powder and air emitted from the device be in the form of a powder spray and that the mixture be of uniform consistency for effective distribution to places to be sprayed with the powder.

Therefore, one of the objects of my present invention is the provision of a check valve structure formed at the lower, or inner end of that part of the device packaging the powder to be sprayed without transfer to an independent spray-gun.

Another object of the invention is a check valve structure of the character described hereinafter, which controls the admittance of air, under pressure, into a check valve chamber for distribution to a powder chamber and an apertured mixing and discharge tube in order that the mixture of air and powder be of a uniform consistency in the discharge tube to be emitted therefrom in the form of a spray for maximum coverage and without clogging at the discharge end of the discharge tube.

The above mentioned, and other advantages of my check valve structure, such, for instance, as simple in construction, economical in production and effective in results attained, will be readily apparent upon consideration of the following specification and accompanying drawing, and in which drawing like characters of reference denote corresponding parts.

Referring to the drawing:

Fig. 1 is an enlarged vertical sectional view of the device embodying the features of my invention, the valve being shown in closed position.

Fig. 2 is a fragmentary view similar to Fig. 1, showing the valve in open position to provide an annular air inlet through the bottom head of the valve casing.

Fig. 3 is a view, reduced in size, taken on line 3—3 of Fig. 1.

Fig. 4 is a view, reduced in size, taken on line 4—4 of Fig. 2, showing the upper valve casing head and the valve partly broken away and showing the valve in open position providing thereby an annular air inlet through the bottom valve casing head.

Fig. 5 is a view partly in side elevation and partly in vertical section of a powder container and distributor including the device embodying the features of my invention.

The powder container proper shown in Fig. 5, comprises a tubular fibrous body member 1 provided with a powder storage chamber 1'. A second tubular fibrous member designated 2, which is mounted on the tubular member 1 and adhesively secured thereto, is provided with a sheet metal top closure head 3 provided with an air and powder discharge opening 4.

The reference character 5 designates a tubular fibrous plunger member having telescopic connection with the tubular fibrous body member 1, and the member 5 is provided at its inner end with a sheet metal closure head 6 having a pair of air inlets 7 closed and opened by means of a pair of suitable flap valves 8 formed by the end portions of a fibrous strip 9 anchored midway its ends to the head 6 by means of fastening prongs 10 formed from the head material. The plunger member 5 is telescopically connected with the powder container body 1 for reciprocating movement thereon so as to serve as a plunger element to force air, under pressure, into the device for mixture with powder carried in the container body 1 and to be emitted in the form of a powder spray, after final mixture in an apertured discharge tube 11 in communication at one end with the discharge opening 4 in the top head closure 3.

In carrying out the present invention, namely, the check valve structure, the lower, or inner end portion of the tubular member 1 serves as the side wall of the valve casing and is designated 12. The inner end of the tubular member 1 is provided with a sheet metal outer head design-

nated, generally, as 13 having a central valve opening 14. Spaced inwardly from the container head 13 is an inner flexibly resilient auxiliary head 15. The flexibly resilient head 15 is shown as provided with a series of air inlet openings 16, leading to the powder chamber 1', although these openings may be eliminated, if so desired. The auxiliary head 15 is provided with an opening 17 whether the head is provided with air inlet openings 16, or not. The discharge tube 11, which is provided with side wall apertures or openings 18 for the admission of powder, or powder and air thereinto from the powder chamber 1' in the container body 1, is projected through the opening 17 in the flexibly resilient fibrous inner head 15 and rests upon sheet metal closure head 13 adjacent the edge of the central valve opening 14 therein, and the lower edge of the tube is spaced from the remainder of the head due to the head being formed with a suitable annular air channel 19 and flat annular body portion 19' surrounding the opening, and which channel serves to admit air from the air distributing chamber 20 formed within the side wall 12 and the heads 13 and 15 forming the valve casing, into the discharge tube 11 from the lower or inner end thereof.

A suitable sheet metal check valve designated, generally as 21, is designed to open and close the central opening in the valve casing head 13. The valve 21 is in the form of an inverted frusto-conical member having a closed lower end 22 with its upper, or opposite end open. An outstanding flange 23 terminates from the upper end of the wall at the upper open end of the valve member 21, and the flange 23 is seated against the flexibly resilient inner, or auxiliary valve casing head 15 with the narrow, or lower end projecting through the central opening 14 in the outer sheet metal valve casing head 13. The valve 21 keeps the central opening 14 in the head 13 normally closed. Upon reciprocating the plunger member 5, movement thereof in one direction compresses air taken therein and forces it under pressure against the valve 21, causing the inner flexibly resilient head 15 to yield inwardly, thereby allowing sufficient movement of the valve 21 inwardly to provide an annular air inlet opening 24 between the valve member 21 and the edge 25 of the central valve opening 14 in the valve casing head 13 to admit air, under pressure, into the air distributing chamber 20 within the valve casing to be distributed from there through the opening 17 in the flexibly resilient fibrous valve casing head 15, and into the powder chamber 1' of the tubular member 1, and from there with powder into the apertured discharge tube 11. At the same time air is distributed by way of the valve casing head channel 19 into the discharge tube 11 through the open lower end thereof for final mixture therein with the powder and air admitted into the apertured discharge tube 11 from the powder chamber 1' to be emitted in the form of a powder spray through the discharge opening 4 in the head 3. When the inlet openings 16 in the flexibly resilient valve casing head 15 are omitted, the air, under pressure, follows the course described to and through the discharge tube 11, mixing with powder sifting through the discharge tube openings 18 from the powder chamber 1' of the tubular member 1.

Movement of the plunger member 5 opposite to the compression stroke thereof, releases pressure against the valve 21 and the flexibly resili-

ent head 15, and the head 15, in returning to normal moves the valve 21 into position under sufficient pressure to close the central opening 14 in the valve casing head 13, thereby closing the annular air inlet 24 formed when the valve 21 is moved, under air pressure, relative to the central valve opening 14.

In a check valve of this character, it is, from a commercial aspect, necessary to produce a device which may be manufactured at a low cost, as it is ordinarily used for only the period of time necessary to discharge the powder contents of the insecticide package, and yet it must be efficient in its purpose to admit air into a powder container body and a discharge tube.

The many advantages of the herein described invention will readily suggest themselves to those skilled in the art to which it appertains.

Various changes and alternative arrangements without affecting the device, may be made within the scope of the appended claims, in which it is my intention to claim all novelty in the invention as broadly as the prior art permits.

What I claim is:

1. A check valve comprising a casing including the side wall of a powder container, a closure head for one end thereof and an auxiliary head of flexibly resilient material spaced from the closure head to form an air distributing chamber therebetween, said closure head having a central opening therein, the closure head being deformed to provide an annular channel concentric with the central opening, an inverted frusto-conical shaped valve projecting through said central opening, said valve being closed at its smaller end and open at its wider end and with the side wall of the valve normally engaging the edge of the central opening, an outstanding flange at the open end of the valve seated against the auxiliary head, said valve adapted to be moved, by means of air pressure, against the auxiliary head to provide an annular air inlet to the air distributing chamber, said auxiliary head having an opening therein, and a discharge tube projecting through said last mentioned opening and seated on the closure head adjacent the central opening so as to overlie the annular channel.

2. A device as defined in claim 1, including a series of perforations formed in the auxiliary head in circular arrangement opposite the said annular channel.

3. A check valve comprising a casing including the side wall of a container body, a sheet metal head secured to one end of the body, an auxiliary inner head formed of flexibly resilient fibrous material spaced from the sheet metal head to provide an air distributing chamber therebetween, said sheet metal head having a central opening therein and deformed to provide an annular channel concentric with the central opening, a cup-shaped sheet metal valve projecting through said central opening, an outstanding flange formed at the open end of said valve seat against the flexibly resilient inner auxiliary head to retain the valve in its normally closed position, and said valve adapted to be moved in the direction of the auxiliary head, under air pressure, to provide an annular air inlet leading to the air distributing chamber, and a discharge tube projecting through the opening in the auxiliary head and seated upon the sheet metal head adjacent the central opening therein so as to overlie the annular channel formed on the sheet metal head.

4. A device as defined in claim 2, including a series of perforations formed in the auxiliary head.

5. A valve of the class described comprising a portion of the side wall of a container body, a sheet metal head secured to one end of the body having a central opening, an auxiliary head of flexibly resilient fibrous material having a circular series of perforations spaced from the sheet metal head to provide an air distributing chamber between said heads, a hollow valve member having a tapered side wall, an outer closed end, and an open inner end projecting at its narrow end through said central opening to normally close the central opening, an outstanding flange at the open end of the valve member seated against the auxiliary head to cause the auxiliary head to yield in the direction of air pressure directed against the projecting end of the valve member to provide an annular air inlet between the valve member and the edge of the central opening communicating with the air distributing chamber, and said flexibly resilient auxiliary head adapted to exert pressure against the flange on the valve member to cause the valve member to close the annular air inlet when air pressure has been released against said auxiliary head, and the auxiliary head having an air outlet.

6. A device as defined in claim 5, including an annular channel formed by deforming the sheet metal head concentric with the central opening therethrough, and a discharge tube projecting through the air outlet adapted to rest upon the sheet metal head adjacent the central opening and to overlie the annular channel.

7. A check valve having a casing comprising a body formed with a pair of spaced heads to provide an air chamber therebetween, one of the heads having a series of air perforations, a central opening formed in the other head, a normally closed valve member projecting through the central opening and seated against the head having the air perforations, said valve and the head having the air perforations being movable, under air pressure, to open the valve relative to the opening in the said other head to provide an annular air inlet opening leading to the air chamber, the perforated head being formed of flexibly resilient fibrous material to move the valve to closed position when air pressure is released thereagainst, and an air outlet leading from the air chamber through the flexibly resilient fibrous head.

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