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J. A. WEST

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DISPERSER FOR POWDER SPRAY SYSTEM

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Fig. 1.

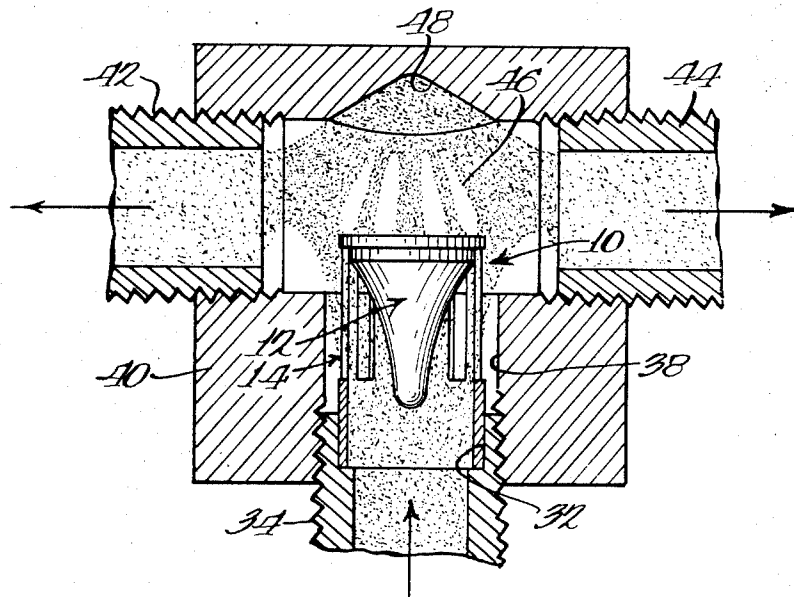


Fig. 2.

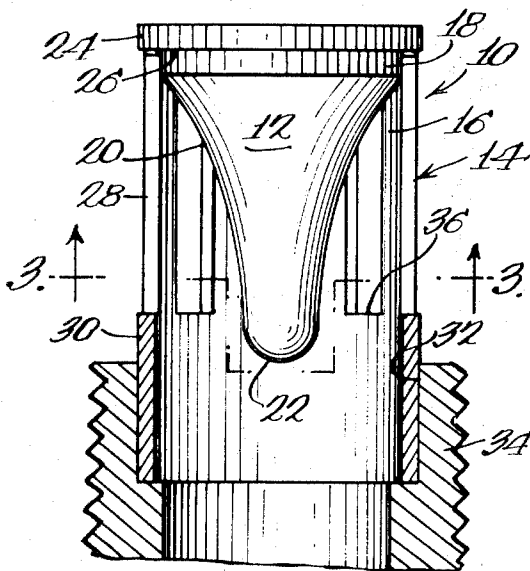
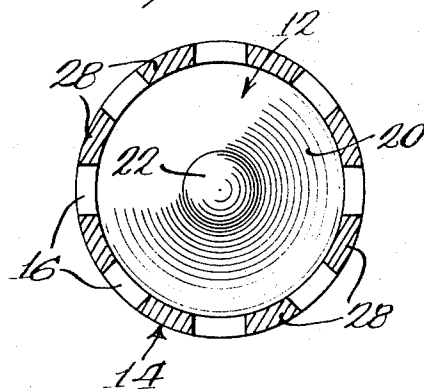


Fig. 3.



Inventor:

James A. West

By Gary Parker, Juettner & Cullinan  
Att'ys

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## DISPERSER FOR POWDERED SPRAY SYSTEM

James A. West, Elmhurst, Ill., assignor to Binks Manufacturing Company, Chicago, Ill., a corporation of Delaware

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8 Claims

### ABSTRACT OF THE DISCLOSURE

A dispersing device for use in a powder spray system including a generally conical deflector member surrounded by a peristome or the like and normally arranged in a powder conduit of a manifold assembly at a location where the powder is divided so as to be conducted through two or more branch conduits, the disperser serving to distribute the powder in a uniform manner and assure that the powder is uniformly supplied to the several branch conduits.

### BRIEF SUMMARY OF THE DISCLOSURE

The present invention relates to a powder spray system. One example of an application for a powder spray system is where a powder and air mixture is sprayed on the surfaces of printed sheets after the printing thereof and before other sheets are stacked thereon, whereby the powder acts as a spacer until the ink has dried and thereby prevents any offset effect as when ink on one sheet is transferred to the back of an adjacent sheet. Another example is where powder is sprayed on a continuous web of plastic material prior to or during the winding of the latter in a roll. The powder prevents the layers of plastic from adhering to one another thus assuring that the plastic roll can subsequently be unwound without difficulty. In the foregoing as well as in various other applications it is known to mix a material in powder form with a fluid such as compressed air and to spray the mixture of powder and air on flat sheet material or on a continuous web of material where it is desired to prevent adhesion of the same or other materials thereto. The foregoing illustrations are merely by way of example since the present invention is useful in any application where a material in powder form is mixed with a fluid such as air and conducted through a manifold assembly or the like to powder spray nozzles or other discharge means.

Where a powder and air mixture is being conducted through a manifold having a series of conduits and fittings to a plurality of spray nozzles it is often quite difficult to provide an even distribution of the powder to the various nozzles. As the powder and air mixture passes through a right angle fitting, for example, the powder due to inertia will tend to impinge against a wall of the fitting and be deflected therefrom, all of which contributes to an uneven distribution of the powder in the conduit. Thus, when the powder is supplied to a manifold system having various T fittings or the like which distribute the powder and air mixture along various conduits to the different powder spray nozzles, there is a tendency for certain of the nozzles to receive a much heavier concentration of powder than others.

It is therefore an object of the present invention to provide an improved dispersing device for use in con-

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junction with a powder spray system to provide a uniform distribution of powder in the system and thus a uniform distribution of powder to each of the several spray nozzles or the like to which the powder and air mixture is supplied.

It is a further object of the invention to provide an improved dispersing device as last above-mentioned which will tend to induce a positive static charge on the powder particles thereby increasing their tendency to instantly bond to sheets or webs of material onto which the powder is applied by the powder spray system.

The foregoing and other objects and advantages of the invention will be apparent from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings.

### DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical sectional view, partly in elevation, showing a dispersing device constructed in accordance with the present invention, the dispersing device being shown mounted in a T block which comprises a component of a manifold assembly for distributing a powder and air mixture;

FIG. 2 is an enlarged elevational view, partly in section, showing the dispersing device of FIG. 1; and

FIG. 3 is a horizontal sectional view taken substantially along the line 3—3 of FIG. 2.

Now in order to acquaint those skilled in the art with the manner of making and using my invention, I shall describe, in conjunction with the accompanying drawings, a preferred embodiment of the invention.

### DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, there is shown a dispersing device 10 comprising a generally conical-shaped mandrel 12 surrounded by a generally tubular gate member or peristome 14 having a plurality of slots or openings 16 formed therein. The mandrel 12 has a straight cylindrical end portion 18, and the mandrel body is tapered inwardly in a generally conical manner except that the sides 20 of the mandrel are curved in concave fashion and the small end 22 thereof is rounded. As shown in FIG. 2, the large upper end of the mandrel 12 is provided with a cylindrical rim portion 24 having a diameter larger than the cylindrical end portion 18 so as to define an annular ledge 26.

The peristome member 14 which surrounds the mandrel 12 comprises a tube having a plurality of circumferentially spaced slots 16 formed therein so as to define a plurality of spaced fingers 28. The slots 16 extend for only a portion of the length of the peristome thereby providing a solid tubular end portion 30 which as shown in FIG. 2 is mounted in a counterbore 32 formed in the end of a fitting 34. The lower ends of the slots 16 are defined by ledge portions 36, while at the upper end of the peristome the slots 16 extend through to the end of the tube thereby fully separating the upper ends of the fingers 28.

The mandrel 12 and peristome 14 are assembled so that the individual ends of the fingers 28 extend around the cylindrical end portion 18 and abut against the annular ledge 26, the assembly being made by soldering or otherwise securing the ends of the fingers to the annular ledge 26. FIG. 1 shows an application of the foregoing diffuser assembly 10 where the straight fitting 34 which carries the diffuser assembly is threaded into an

inlet 38 in a T block 40. A pair of fittings 42 and 44 are threaded into a pair of oppositely disposed openings in the sides of the T block 40 so as to define a pair of outlets. The interior of the T block 40 comprises a chamber 46 which permits the inlet fitting 34 to communicate with the two oppositely disposed outlet fittings 42 and 44, and it will be seen that in the embodiment being described each of the outlet fittings is disposed at a right angle to the inlet fitting 34. In the embodiment described the chamber 46 in the T block 40 is provided with a dimple 48 which is disposed opposite the inlet fitting 34 and dispersing device 10.

It is an important feature of the present invention that the sides 20 of the generally conical mandrel 12 are concave, and it is also highly desirable that the small end 22 of the mandrel be rounded or generally hemispherical. In the embodiment described, the diameter of the small hemispherical end 22 of the mandrel 12 is equal to at least approximately one-fourth of the diameter of the large cylindrical end portion 18 of the mandrel. It has been found that the concave sides 20 of the mandrel 12 together with the rounded or hemispherical end portion 22 thereof impart a spinning action to the powder which assists in uniformly distributing the same in the powder and air mixture passing into the chamber 46 from the inlet fitting 34.

Referring again to the peristome or gate member 14 which surrounds the mandrel 12, it is desirable that the total open area provided by the slots or openings 16 be equal to or larger than the inner diameter of the supply conduit 34 so as to avoid creating any back pressure at the disperser 10. The length of the slots 16 is also important and as shown in FIG. 2 the lower ends of the slots terminate short of the end of the rounded end portion 22 of the mandrel 12. It has been found that by having the rounded end portion 22 of the mandrel 12 project beyond the ends of the slots 16 the disperser is substantially more effective in causing the powder and air mixture to swirl around the mandrel thereby increasing the dispersing action of the device and contributing to the uniform distribution of powder through the ports 16. At the opposite end of the disperser the slots 16 extend the full length of the mandrel 12 and terminate approximately at the annular ledge 26. It will of course further be seen that the slots are of uniform width and are uniformly spaced from one another, and the peristome or gate 14 completely surrounds the mandrel 12. In the embodiment being described there are eight slots or ports 16 spaced apart 45 degrees around the outside of the mandrel.

In operation, a material in powder form is mixed with a fluid such as compressed air and is conducted through the supply conduit 34 to the T block 40, the objective being to supply the powder and air mixture to the two outlet fittings 42 and 44 and to provide for an equal distribution of the powder between the two outlet fittings. When the powder and air mixture impinges against the mandrel 12 a spinning motion is imparted to the mixture and it is caused to swirl around the mandrel eventually passing out through the several slots 16 and into the chamber 46 from which it passes into the two outlet fittings 42 and 44. It has been found that a disperser as described hereinabove is extremely effective in producing an even distribution of powder between the two outlet fittings 42 and 44. In addition, such a disperser has been found to impart a positive static charge to the powder particles which increases their tendency to adhere to the sheets or webs of material onto which the powder is ultimately sprayed after being conducted to a plurality of spray nozzles or the like as earlier described herein.

It will be understood that the disperser of the present invention is suitable for use in various types of powder spray systems and is intended to be used at locations in the system where it is particularly important to provide for uniform distribution of the powder such as in a manifold assembly having mounting blocks or conduits where a powder and air mixture or the like is to be delivered

from a supply fitting to a plurality of outlet fittings and where it is important that the powder be evenly distributed to the several outlet fittings.

I claim:

1. For use in a powder spray system, an improved dispersing device comprising, in combination, a central mandrel member which is generally conical in its configuration and having sides formed with a radius so as to be generally concave, said mandrel member being circular in its transverse cross section and being oriented parallel to the direction of flow of a powder and air mixture to be sprayed with a small end of said mandrel member facing in a direction opposite to said direction of flow, and generally straight tubular peristome means surrounding said mandrel member and having a plurality of circumferentially spaced longitudinal slots therein, said slots being substantially equally spaced around the outside of said mandrel member so as to define therebetween a plurality of substantially straight longitudinal deflector fingers.

2. The invention of claim 1 where said small end of said mandrel member is rounded so as to be generally hemispherical in its configuration.

3. The invention of claim 1 where said slots extend generally parallel to the axis of said mandrel member and where the length of said slots is such that they extend in one direction substantially to a large end of said mandrel member whereas in the opposite direction said slots terminate short of said small end of said mandrel member.

4. The invention of claim 3 where an end of said peristome means adjacent said small end of said mandrel member comprises a generally solid tubular portion and where said small end of said mandrel member projects beyond the adjacent ends of said slots and into said solid tubular portion of said peristome means.

5. The invention of claim 1 where said slots extend completely through to the end of said peristome means adjacent the large diameter end of said mandrel member so as to define a plurality of fingers on said peristome means having individual end portions, said individual end portions of said fingers being attached to said mandrel member adjacent said large diameter end thereof to provide an assembly of said mandrel member and said peristome means.

6. The invention of claim 2 where the diameter of said small hemispherical end of said mandrel member is equal to at least approximately one-fourth of the diameter of the large end of said mandrel member.

7. For use in a powder spray system, an improved dispersing device comprising, in combination, a central mandrel member which is generally conical in configuration having a small diameter hemispherical end portion and a large diameter end portion, and the sides of said mandrel member intermediate said end portions being formed with a radius so as to be generally concave in configuration, said mandrel member being circular in transverse cross section and being oriented parallel to the direction of flow of a powder and air mixture to be sprayed with said small end facing in a direction opposite to said direction of flow, and generally tubular peristome means surrounding said mandrel member and having a plurality of circumferentially spaced longitudinal slots formed therein so as to be equally spaced around the outside of said mandrel member, said slots being of such a length that they extend in one direction substantially to the large diameter end of said mandrel member whereas in the opposite direction said slots terminate short of said small hemispherical end of said mandrel member whereby said hemispherical end projects beyond the adjacent ends of said slots and into a solid tubular portion of said peristome means.

8. The invention of claim 7 where the diameter of said hemispherical end of said mandrel member is equal to at least approximately one-fourth of the diameter of the large end of said mandrel member and where said slots extend completely through to the end of said peristome

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means adjacent the large diameter end of said mandrel member so as to define a plurality of fingers on said peristome means having individual end portions, said individual end portions of said fingers being attached to said mandrel member adjacent said large diameter end thereof to provide an assembly of said mandrel member and said peristome means.

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LLOYD L. KING, Primary Examiner

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