United States Patent [19]

Payne et al.

[11] E **Patent Number: Re. 33,394**

[45] **Reissued Date of Patent: Oct. 23, 1990**

[54] **SYSTEM FOR INSIDE POWDER STRIPING OF WELDED FOOD CANS**

[75] Inventors: **Robert D. Payne**, Countryside; **James E. Pazak**, Westchester; **Wesley J. Szpitalak**, Palos Park, all of Ill.

[73] Assignee: **Continental Can Company, Inc.**, Del.

[21] Appl. No.: **378,276**

[22] Filed: **Jul. 11, 1989**

Related U.S. Patent Documents

Reissue of:

[64] Patent No.: **4,205,621**
Issued: **Jun. 3, 1980**
Appl. No.: **2,033**
Filed: **Jan. 8, 1979**

[51] **Int. Cl.**[5] **B05B 5/02**
[52] **U.S. Cl.** **118/622**
[58] **Field of Search** 118/622

[56] **References Cited**

U.S. PATENT DOCUMENTS

847,269	3/1907	Wise .	
1,830,598	11/1931	Fagan	427/435
3,077,171	2/1963	Gotsch et al.	118/317
3,291,631	12/1966	Smith .	
3,394,450	7/1968	Gill et al. .	
3,422,795	1/1969	Smith .	
3,491,721	1/1970	Gill et al. .	
3,526,027	9/1970	Manuel	427/345
3,724,416	4/1973	Diamond et al. .	
3,814,002	6/1974	Rombach et al. .	
3,882,818	5/1975	Mowbray	118/326
3,918,401	11/1975	Blakeslee	427/30
4,098,226	7/1978	Furter	118/622

FOREIGN PATENT DOCUMENTS

2704501	8/1977	Fed. Rep. of Germany .
529590	12/1972	Switzerland .

Primary Examiner—Sam Silverberg
Attorney, Agent, or Firm—Wood, Herron & Evans

[57] **ABSTRACT**

A powder stripe application system wherein substantially all powder introduced into the system is applied to side seam areas of can bodies with that powder which is not initially bonded to a can body being directly recycled within the system. The system includes a delivery nozzle which has an adjustable mounting which permits the powder stream to be positioned as desired.

23 Claims, 2 Drawing Sheets

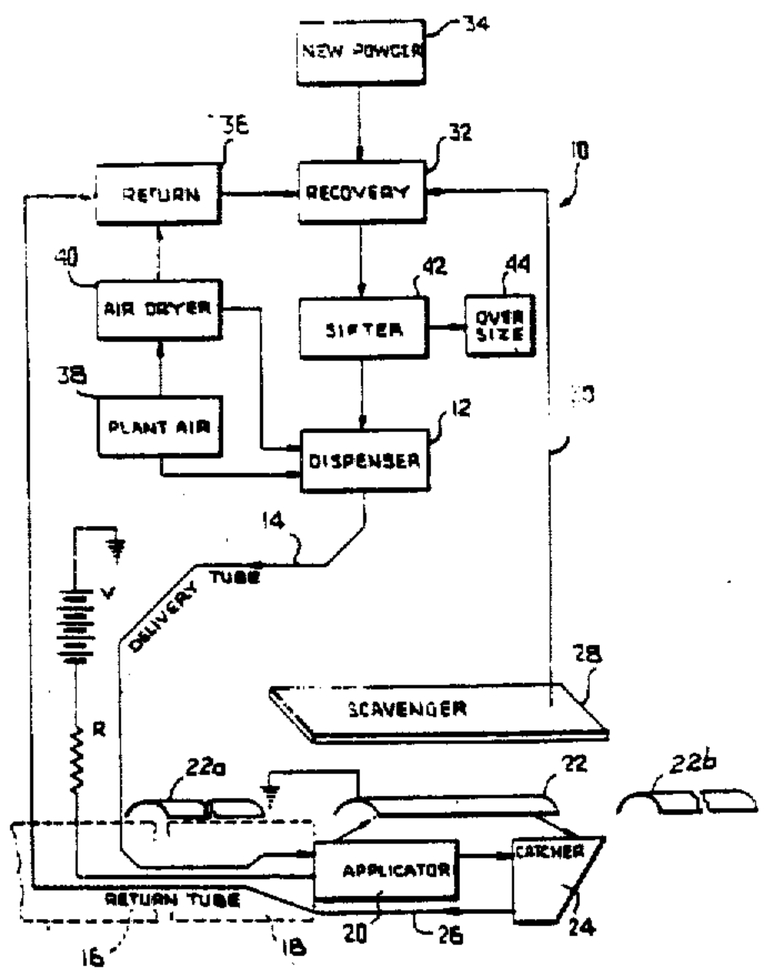


Fig. 1

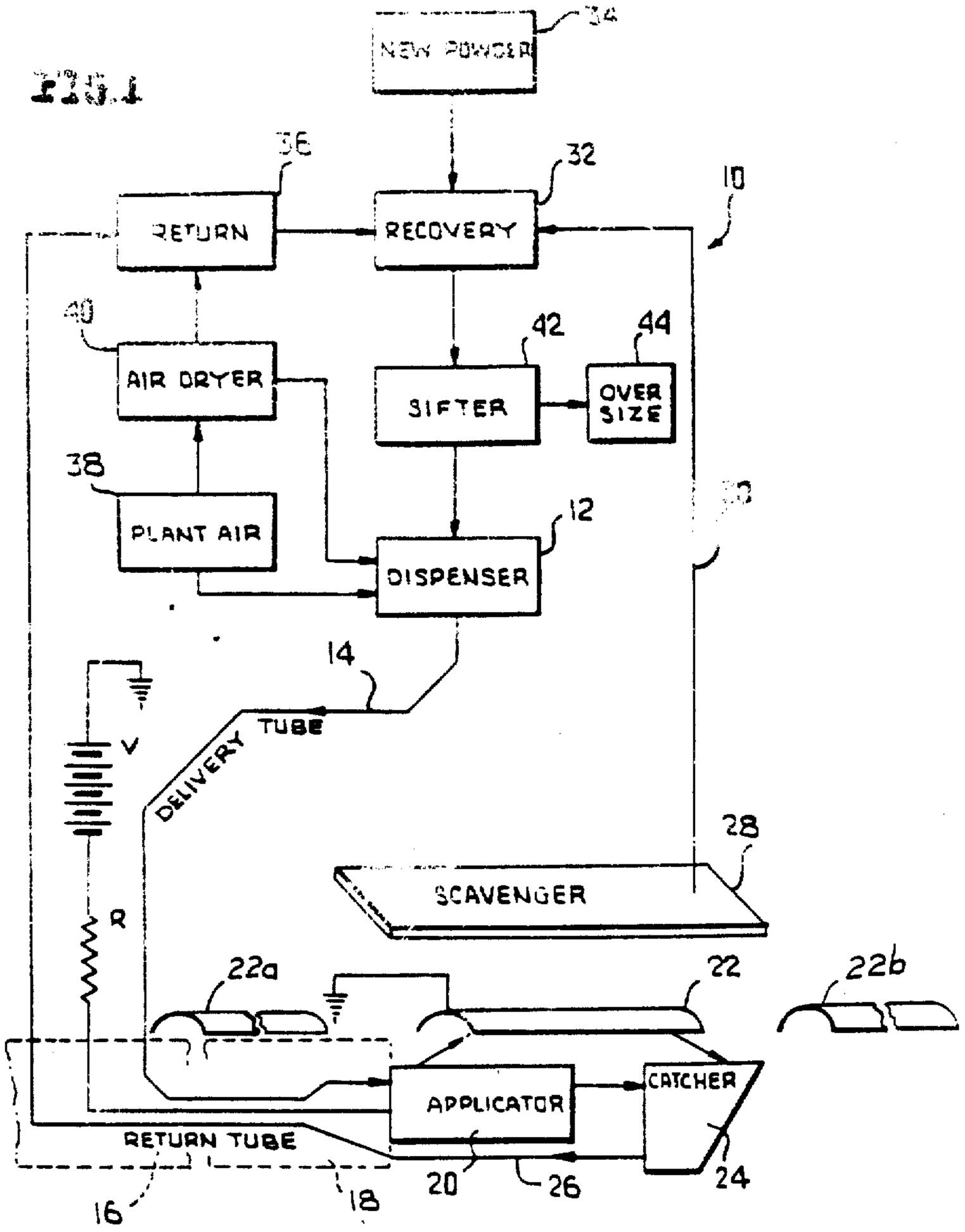
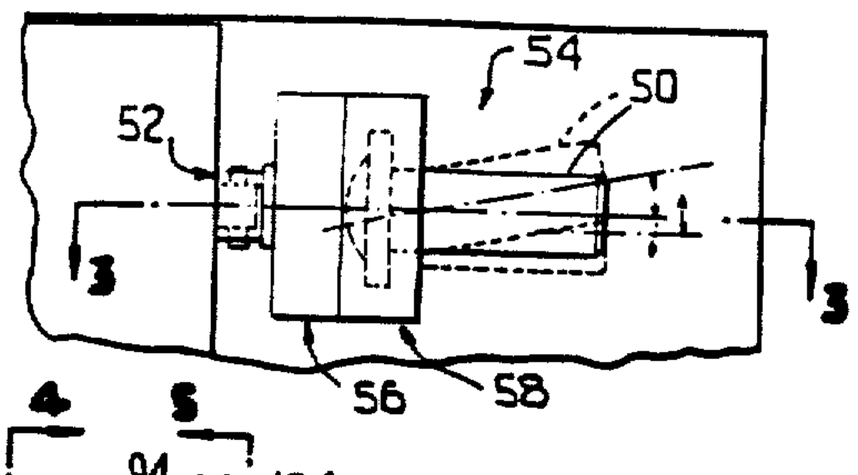

NEW POWDER
34
36
RETURN
32
RECOVERY
10
40
AIR DRYER
42
SIFTER
44
OVER SIZE
38
PLANT AIR
12
DISPENSER
14
DELIVERY TUBE
V
R
28
SCAVENGER
22a
22
22b
APPLICATOR
CATCHER
RETURN TUBE
16
18
20
26
24

FIG.2



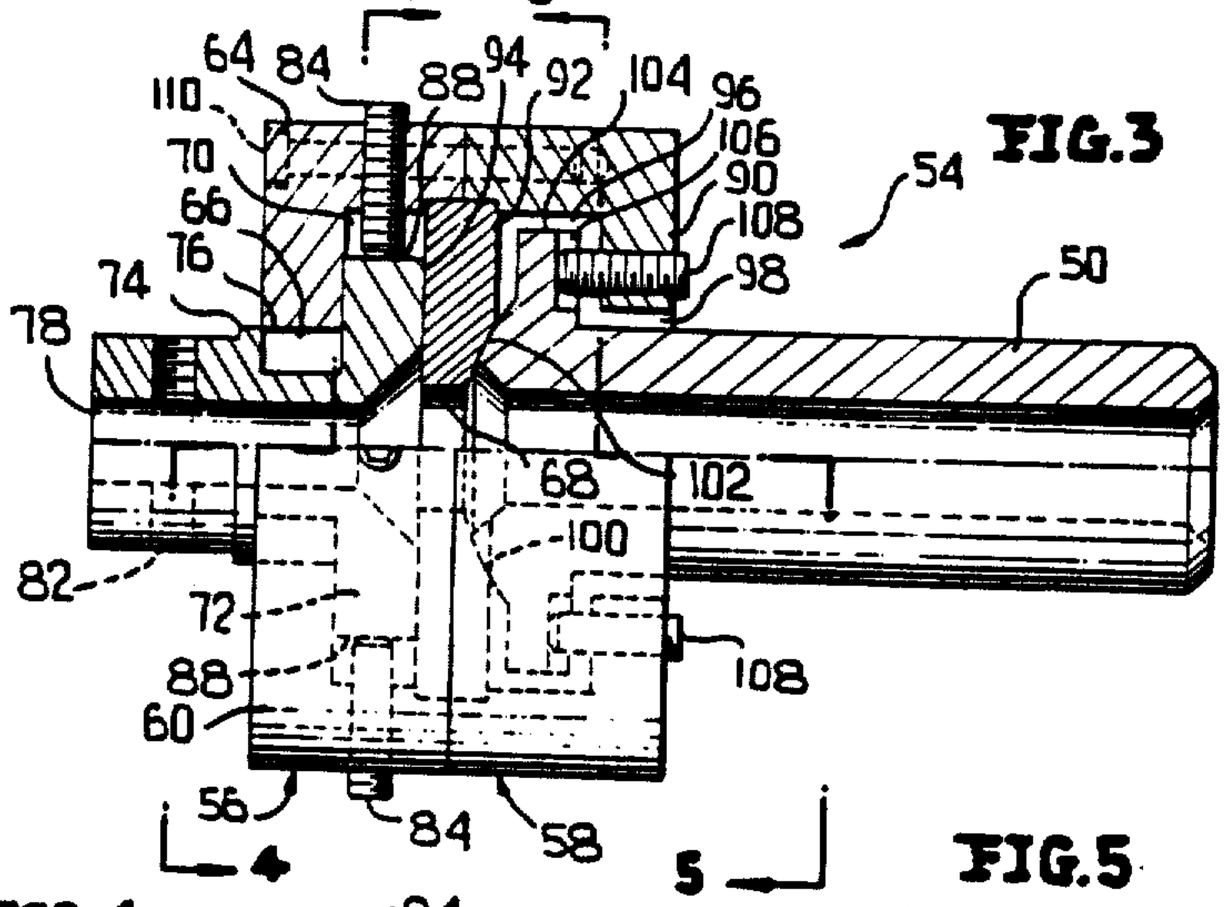


FIG.3

FIG.4

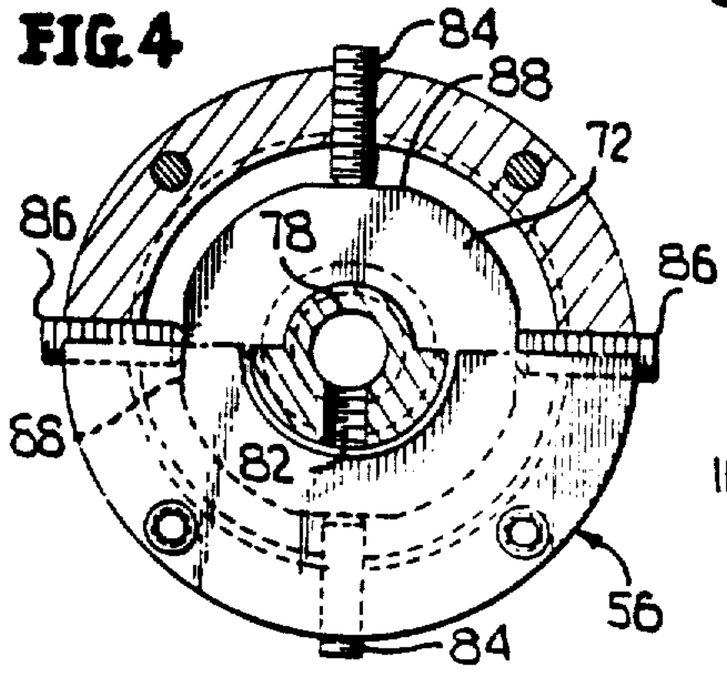
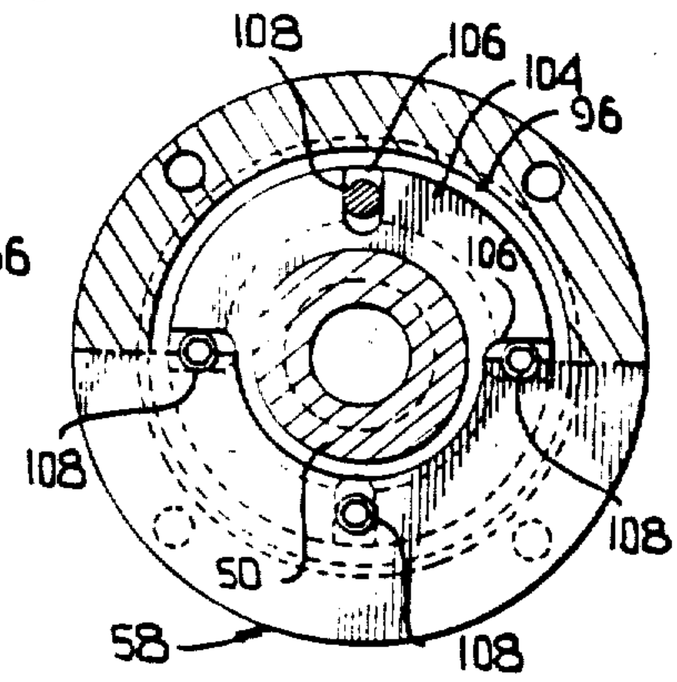


FIG.5



SYSTEM FOR INSIDE POWDER STRIPING OF WELDED FOOD CANS

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This invention relates in general to new and useful improvements in the coating of can bodies, and more particularly to the inside powder striping of welded food cans.

The powder striping of the side seam area of welded food cans possesses a problem different from the powder striping of welded beverage cans in that the welded beverage cans, after they have been side striped, are provided with an over-coat which is baked in place with the result that any stray powder particles not applied to the side seam area are fully bonded to the interior of the can body and cannot become loose at a later date and thus form a contaminant. On the other hand, the over-coat is not required with respect to food cans, and it would not be economically feasible to provide such an over-coat merely for the purpose of assuring the bonding of stray powder particles to the interior of a food can so that it cannot later become a contaminant.

In the formation of a welded food can, no internal coating is applied along the two edges of the body blank which are to be welded together with the result that the side seam area of a welded food can has no internal coating. When the can body is formed of steel that is tin free (no tin coating), it is necessary to apply a coating to the interior of the can body both to prevent corrosion of the can body and the contamination of the food product by way of transferred metal ions. Accordingly, after the side seam has been formed it is necessary to coat the side seam area, and this may be beneficially accomplished by the electrostatic depositing of coating material in powder form. The powder so applied is heated by the inherent temperature of the side seam area due to the welding, and automatic bonding of the powder occurs in the side seam area.

It has been found that when powder application systems suitable for use in coating side seams of beverage cans have been utilized, there have been certain deficiencies particularly by way of stray powder particles. The powder particles which stray from the side seam area frequently are heated to the extent that they loosely bond to the previously applied coating, but during handling of the can come loose and thus exist within the food product as a contaminant. In accordance with this invention, it is highly desirable that the stray powder particles not become bonded to portions of the can body adjacent the side seam area, and this can be effected only by eliminating the stray powder particles from the area outside of the side seam area.

In accordance with this invention, there is provided a suitable system which not only provides means for catching the powder particles which do not adhere to the side seam area, but also to retrieve all powder which is dispensed between adjacent can bodies.

It is also a primary feature of this invention to provide a powder system wherein the powder which is directed against a can body side seam portion and does not bond thereto is immediately retrieved and recirculated directly within the system. Thus substantially all powder entering the system is applied to can bodies.

Another feature of the invention is the construction of a powder applicator wherein the delivery nozzle may be readily adjusted as required to assure the directing of powder against the side seam area of can bodies to be coated.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawings.

IN THE DRAWINGS

FIG. **1** is a schematic view showing the overall system of the powder stripe applicator of this invention.

FIG. **2** is a schematic top plan view of the powder applicator, showing the several adjusted positions of the delivery nozzle.

FIG. **3** is a longitudinal sectional view taken through the applicator generally along the line **3—3** of FIG. **2**, and shows the constructional details of the mounting of the delivery nozzle.

FIG. **4** is a transverse sectional view taken generally along the line **4—4** of FIG. **3**, and shows the adjustable mounting of the nozzle housing on a supply fitting.

FIG. **5** is a transverse sectional view taken generally along the line **5—5** of FIG. **3**, and shows the adjustable mounting of the delivery nozzle with respect to the housing.

Reference is first made to FIG. **1** wherein the powder stripe application system of this invention is best illustrated and is identified by the numeral **10**. First of all, the system **10** includes a dispenser **12** which delivers to a delivery tube **14** an air entrained supply of powder. The delivery tube extends through the customary welding horn **16** and horn extension **18** to an applicator **20** which in itself is not part of this invention. The applicator **20**, however, will be provided with suitable means (not shown) for defining a sealed area of which one wall will be defined by a side seam area of a can body being striped. A suitable delivery nozzle, to be described in detail, delivers the powder into the confined area and generally directs the powder against the side seam area as is schematically illustrated in FIG. **1**. The can body is only partially shown and is identified by the numeral **22**. *As is well known to those skilled in the art, a series of can bodies 22, 22a, and 22b are formed about a conventional welding horn 16, welded, and conveyed in a linear path in spaced end-to-end relationship from the horn to applicator 20. The cans are moved sequentially over the applicator which is disposed inside of the can bodies and is surrounded by them as shown diagrammatically in FIG. 1.*

A large portion of the delivered powder becomes electrostatically bonded to the side seam area and is then fused in situ by the inherent heat resulting from the formation of the side seam being welded. Others of the powder particles bounce off the side seam area and enter into an upper part of a catcher **24**. Certain powder particles flowing directly through the applicator **20** enter the upstream side of the catcher **24** as is diagrammatically illustrated.

The catcher **24** in itself is also not part of this invention and normally will be supported from the applicator **20**. *As shown diagrammatically in FIG. 1, catcher 24 is disposed within can bodies 22 and is surrounded by each of the can bodies 22, 22a, and 22b in sequence as they move over the catcher. The catcher 24 is located downstream of the applicator 20 with respect to the path of movement of the can bodies 22, 22a, and 22b.* The catcher **24** is pro-

vided with a return tube **26** which extends through the horn **16** and horn extension **18** externally of the welding apparatus.

It is to be understood that the can bodies will be delivered to the applicator in slightly spaced relation so that between each can body there will be a spray of powder particles which tend to exit the system,. These powder particles, however, are caught by a scavenger **28** which is positioned adjacent the applicator **20** *outside of the path of the can bodies* (*see FIG. 1*). and which is provided with a return line **30**. The system **10** includes a recovery unit **32** which may be in the form of an integral cyclone/bag house which collects new, returned and scavenged powder and initiates powder conditioning including drying and mixing. The constructional details of the recovery unit **32** may vary.

It will be seen that the recovery unit **32** receives new powder, as required, from a new powder supply **34**. The new powder is pneumatically delivered into the system.

The return line **30** also opens into the recovery unit and returns the powder particles which escape between adjacent can bodies. This return is also of a pneumatic delivery type.

The return tube **26** has a suction formed therein generally by way of a vacuum flow transducer which forms a major component of the return unit which is generally identified by the numeral **36**. The return unit requires air under pressure to operate the same.

It is to be understood that the catcher **24** will receive not only non-applied powder, but also any poorly adhered powder which falls off just after deposition. This return powder may include particles which are heat bonded together, and therefore the return may be considered to include oversize and agglomerated particles.

Plant air is directed by means of a suitable unit **38** both onto the dispenser **12** under pressure and into an air dryer **40** which removes oil, water and particulate contamination from air used to condition, meter, deliver and return powder. Part of the conditioned air is directed into the vacuum flow transducer of the return unit **36** while other is directed into the dispenser **12**.

The powder particles collected by the catcher **24** and the scavenger **28** are mixed with the new powder from the new powder supply **34** in the recovery unit **32** and are pneumatically directed to a sieve **42** which separates the oversize and agglomerated particles and discharges them into an oversize collector **44**. The remaining particles are directed into the dispenser for delivery to the applicator.

It is to be understood that the applicator has associated therewith a D.C. power supply which will be connected to corona charging needles (not shown), and that the can bodies being side striped will be grounded so that the charged powder particles will be directed toward and adhered to the side seam area.

In order that the power particles may be properly directed to the side seam area of a can body and at the desired angle to the can body, there are provided in the applicator means for adjustably mounting a delivery nozzle **50**. First of all, it is to be understood that the applicator will include a supply fitting **52** which, in turn, is carried by and suitably coupled to the delivery tube **14**. The mounting means mounting the delivery nozzle **50** for adjustment relative to the supply fitting **52** in part includes a housing generally identified by the numeral **54**. The housing **54** is of a two-piece construction and includes a first housing half **56** associated with the supply fitting **52** and a second housing half **58** associated with the delivery nozzle **50**.

The housing half **56** is formed to include an outer wall **60** and an inner wall **62** joined by a peripheral portion **64**. The outer wall **60** has an axial opening **66** therethrough while the inner wall **62** has a further axial opening **68** therethrough which is aligned with but is of a smaller size than the opening **66**.

Between the two walls **60**, **62** the housing half **56** defines a socket **70** in which there is received a mounting flange **72** of the supply fitting **52**. The supply fitting **52** is also provided with a closure flange **74** which is spaced from the flange **72** and with the exterior of the supply fitting **52** being undercut as at **76** in alignment with the outer wall **60**. The supply fitting **52** is provided with a through bore **78** having a flared inner end portion **80**.

If desired, the supply fitting may be telescoped over the free end of the delivery tube **14** and secured in place thereon by means of a set screw threaded into a radial bore **82**.

It will be seen that the flange **72** is snugly received between the side walls **60** and **62** and generally forms a seal therewith. On the other hand, the flange, together with the remainder of the supply fitting **52**, is radially adjustable within the socket **70** and the housing half **56** by two pairs of adjusting screws **84** and **86**, as is best shown in FIG. **4**. Preferably the periphery of the flange **72** has flats **88** thereon for engagement between adjusting screws **86**. Thus when the supply fitting **52** has its axis horizontally disposed, the housing **54** together with the delivery tube **50** may be selectively adjusted both vertically and horizontally.

The housing half **58** also includes an outer wall **90** and an inner wall **92** which are connected together by a peripheral portion **94** and define therein a socket **96**. The outer wall **90** has an oversize opening **98** therethrough loosely receiving the delivery tube **50**.

The central portion of the inner wall **92** has a bore therethrough aligned with the bore **68**, the bore in the inner wall **92** being defined by a spherical seat **100**. The inner end of the delivery nozzle **50** is provided with a spherical surface **102** which engages the spherical seat **100** and provides a seal between the delivery nozzle **50** and the housing **54** while at the same time permitting the adjustment of the delivery nozzle **50** relative to the housing **54** for angular pitch and yaw. In order to adjust the angular pitch and yaw, the inner end portion of the delivery nozzle **50** is provided with a flange **104** which is positioned within the socket **96**. The flange **104** has a series of radial recesses **106** in an outermost face thereof with these recesses having engaged therein inner ends of adjusting screws **108** which are arranged in two sets.

Finally, the housing halves **56**, **58** are secured together by a plurality of axially extending fasteners **110** which permit the halves **56**, **58** to be rotatably adjusted relative to one another. Thus the housing **54** and the delivery nozzle **50** may be adjusted about a horizontal axis in a rotational manner.

Although only a preferred embodiment of the invention has been specifically illustrated and described herein, it is to be understood that minor variations may be made in the powder stripe application system and the mounting of the delivery nozzle without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed as new is:

1. A continuous closed loop powder stripe application system for electrostatically applying powder to members moving along a predetermined path in spaced relation, said system comprising an applicator, a catcher for receiving excess powder, a scavenger for receiving powder dispensed between members, a recovery unit for receiving powder from said scavenger and said catcher, a return system between said catcher and said recovery unit, means connecting said scavenger to said recovery unit, a new powder supply connected to said system in accordance with powder utilization, a dispenser for receiving powder from said recovery unit, and a delivery tube for delivering powder to said applicator.

2. A system according to claim 1 wherein there are means in advance of said dispenser for removing oversize powder particles from said system.

3. A system according to claim 2 wherein said means for removing oversize particles is disposed between said recovery unit and said dispenser.

4. A system according to claim 2 wherein said means for removing oversize particles is disposed between said recovery unit and said dispenser and includes a sieve.

5. A system according to claim 1 wherein said return unit includes suction means actuated by air under pressure and said dispenser has an air supply for effecting the delivery of powder to said applicator under air entrained conditions.

6. A system according to claim 1 wherein said applicator includes a generally horizontally extending delivery nozzle and means mounting said delivery nozzle for vertical and horizontal translation.

7. A system according to claim 1 wherein said applicator includes a generally horizontally extending delivery nozzle and means mounting said delivery nozzle for vertical and horizontal translation and for angular pitch and yaw.

8. A system according to claim 1 wherein said applicator includes a generally horizontally extending delivery nozzle and means mounting said delivery nozzle for vertical and horizontal translation and for rotation about a horizontal axis.

9. A system according to claim 1 wherein said applicator includes a generally horizontally extending delivery nozzle and means mounting said delivery nozzle for vertical and horizontal translation, for angular pitch and yaw, and for rotation about a horizontal axis.

10. A system according to claim 1 wherein said applicator includes a generally horizontally extending delivery nozzle and means for mounting said delivery nozzle for angular pitch and yaw.

11. A system according to claim 1 wherein said applicator includes a generally horizontally extending delivery nozzle and means for mounting said delivery nozzle for angular pitch and yaw and for rotation about a horizontal axis.

12. A system according to claim 1 wherein said applicator includes a generally horizontally extending delivery nozzle and means mounting said delivery nozzle for rotation about a horizontal axis.

13. A powder applicator comprising a supply fitting, a separately formed delivery nozzle and means mounting said delivery nozzle for vertical and horizontal translation relative to said supply fitting when said supply fitting is horizontally disposed.

14. The powder applicator of claim 13 wherein said mounting means include means mounting said delivery nozzle for angular pitch and yaw.

15. The powder applicator of claim 13 wherein said mounting means include means mounting said delivery nozzle for angular pitch and yaw and for rotation about a horizontal axis.

16. The powder applicator of claim 13 wherein said mounting means includes a housing formed of two halves. one of said housing halves defining a socket, said supply fitting having a flange seated in said socket for radial movement, and sets of adjusting elements for engaging said flange adjusting said housing and said delivery nozzle vertically and horizontally relative to said supply fitting.

17. The powder applicator of claim 14 wherein said mounting means includes a housing formed of two halves, one of said housing halves defining a socket, said socket including a spherical seat, said delivery nozzle having a spherical end portion engaging said seat, a positioning flange carried by said delivery nozzle disposed within said socket, and axial sets of adjusting elements engaging said positioning flange and adjusting said angular pitch and yaw.

18. The powder applicator of claim 17 wherein the other of said housing halves defines a second socket, said supply fitting has a second flange seated in said second socket for radial movement, and sets of adjusting elements for engaging said second flange and adjusting said housing and delivery nozzle vertically and horizontally relative to said supply fitting.

19. The powder dispenser of claim 18 wherein said housing halves have a common axis, and means for joining together said housing halves in selected rotated positions relative to said common axis.

20. A continuous closed loop powder stripe application system for electrostatically applying powder to inner surfaces of can bodies moving along a predetermined linear path in spaced end to end relation, said system comprising:

an applicator for applying a stripe of powder to an inner surface of each can body;

a catcher for receiving excess powder, said catcher being disposed adjacent to said applicator downstream of said applicator along said linear path of movement of can bodies, said applicator and said catcher being positioned for being successively surrounded by can bodies moving along said linear path;

a scavenger for receiving powder dispensed between can bodies, said scavenger being disposed outside of said linear path of can bodies;

a recovery unit for receiving powder from said scavenger and said catcher;

a return system between said catcher and said recovery unit to transport powder from said catcher to said recovery unit;

means connecting said scavenger to said recovery unit to permit powder collected in said scavenger to flow to said recovery unit;

a new powder supply connected to said system in accordance with powder utilization;

a dispenser for receiving powder from said recovery unit; and

a delivery tube for delivering powder from said dispenser to said applicator.

21. The system of claim 20 in which said catcher is supported from said applicator.

22. The system of claim 20 in which said catcher includes an upper part having an opening adapted to receive particles not adhering to said inner can body surface and an upstream opening adapted to receive particles flowing from said applicator.

23. The system of claim 21 in which said catcher includes an upper part having an opening adapted to receive particles not adhering to said inner can body surface and an upstream opening adapted to receive particles flowing from said applicator.

* * * * *