United States Patent [19]

Otterstetter

[11] **3,924,810**

[45] **Dec. 9, 1975**

[54] **SPRAYABLE MATERIAL CHANGER APPARATUS**

[75] Inventor: **Charles H. Otterstetter,** Southgate, Mich.

[73] Assignee: **Ford Motor Company,** Dearborn, Mich.

[22] Filed: **Nov. 4, 1974**

[21] Appl. No.: **520,759**

[52] **U.S. Cl.** **239/305**

[51] **Int. Cl.²** **A62C 31/00**

[58] **Field of Search** 239/112, 15, 596, 305

[56] **References Cited**

UNITED STATES PATENTS

2,257,004	9/1941	Fleming	239/305
3,348,774	10/1967	Wiggins	239/305
3,674,207	7/1972	Carbonetti, Jr. et al.	239/305
3,782,632	1/1974	Braun et al.	239/305
3,793,049	2/1974	Probst	239/15

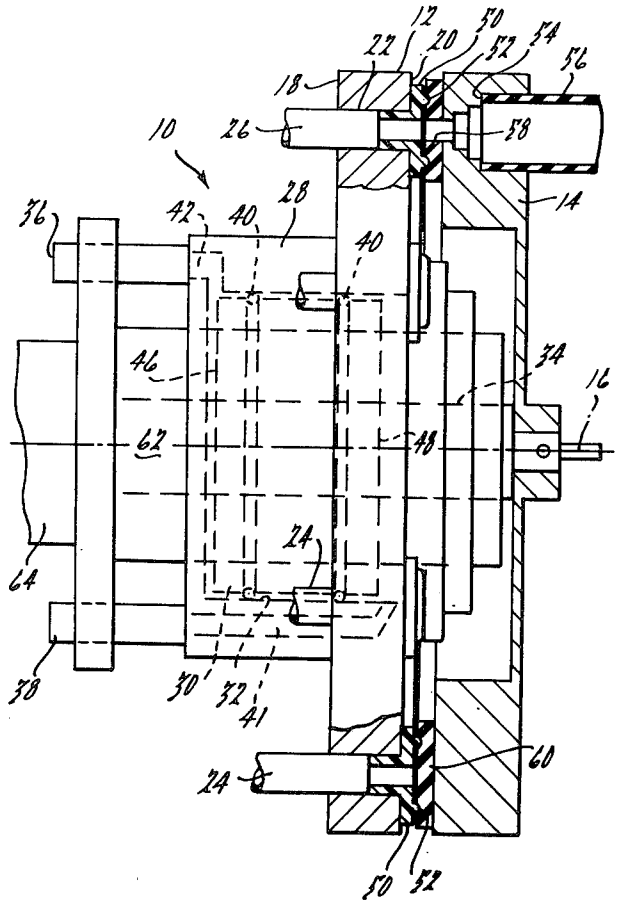
Primary Examiner—Lloyd L. King

Attorney, Agent, or Firm—Robert A. Benziger; Keith L. Zerschling

[57] **ABSTRACT**

Apparatus is disclosed for communicating a plurality of fluidized sources with a spray apparatus. A plurality of sources are communicated to individual ones of a plurality of ports extending through a stationary plate member. A rotary and longitudinally displaceable plate member is arranged in alignment with the stationary plate member and is provided with a single orifice which communicates with the spray apparatus. The rotary plate is further provided with means forming a sealing member which are arranged to cooperate with gasket means provided for each of the source orifices on the stationary plate member so as to sealingly close the nonselected orifices and to provide for contamination free communication between the selected source orifice and the single orifice on the rotary plate member.

5 Claims, 5 Drawing Figures



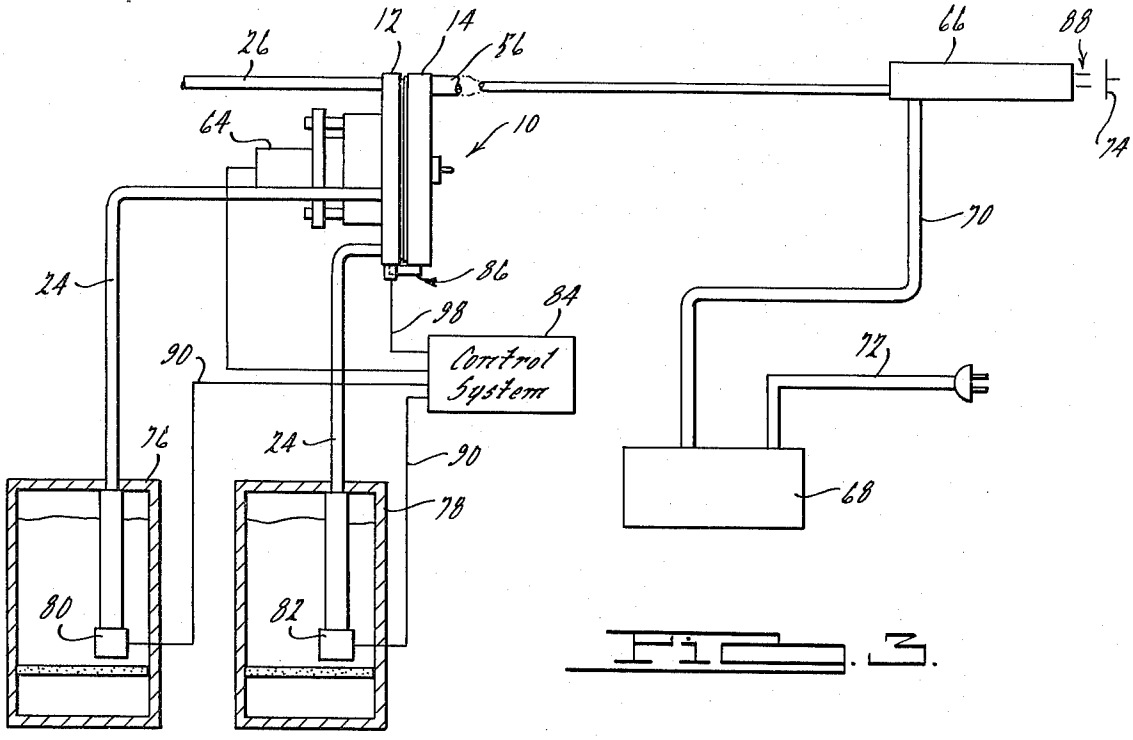
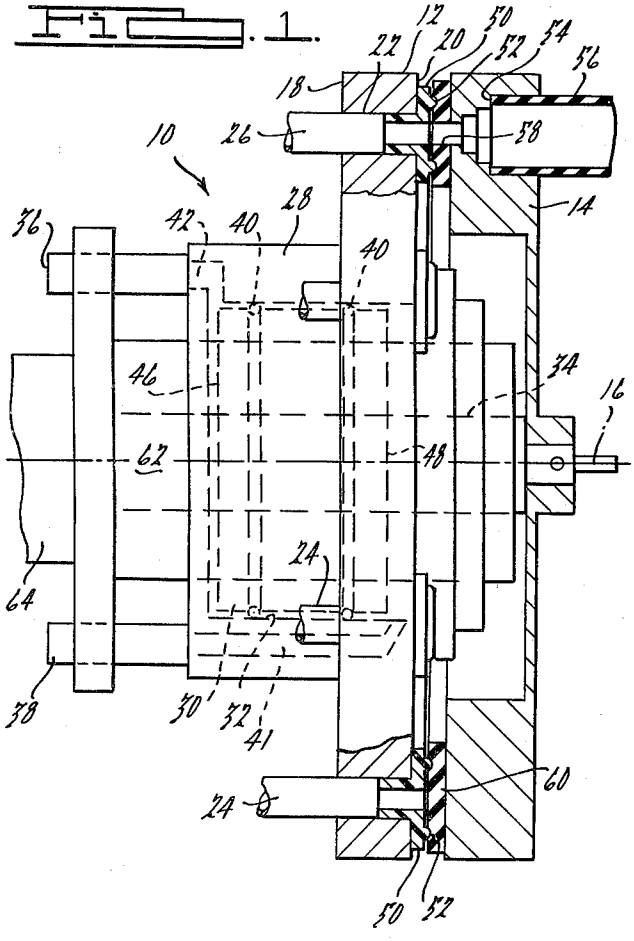


Fig. 3.

Fig. 1.



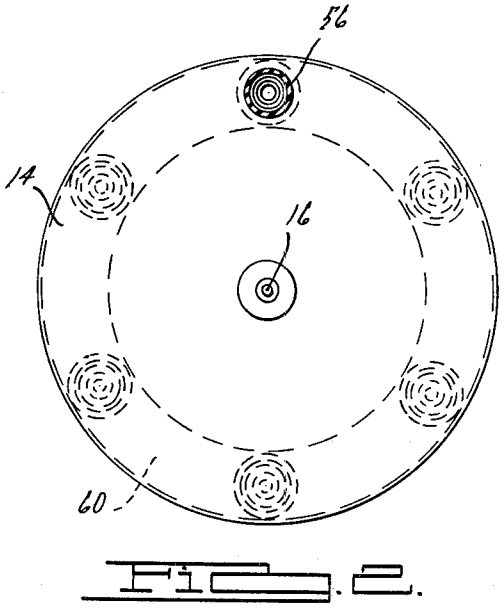


Fig. 2.

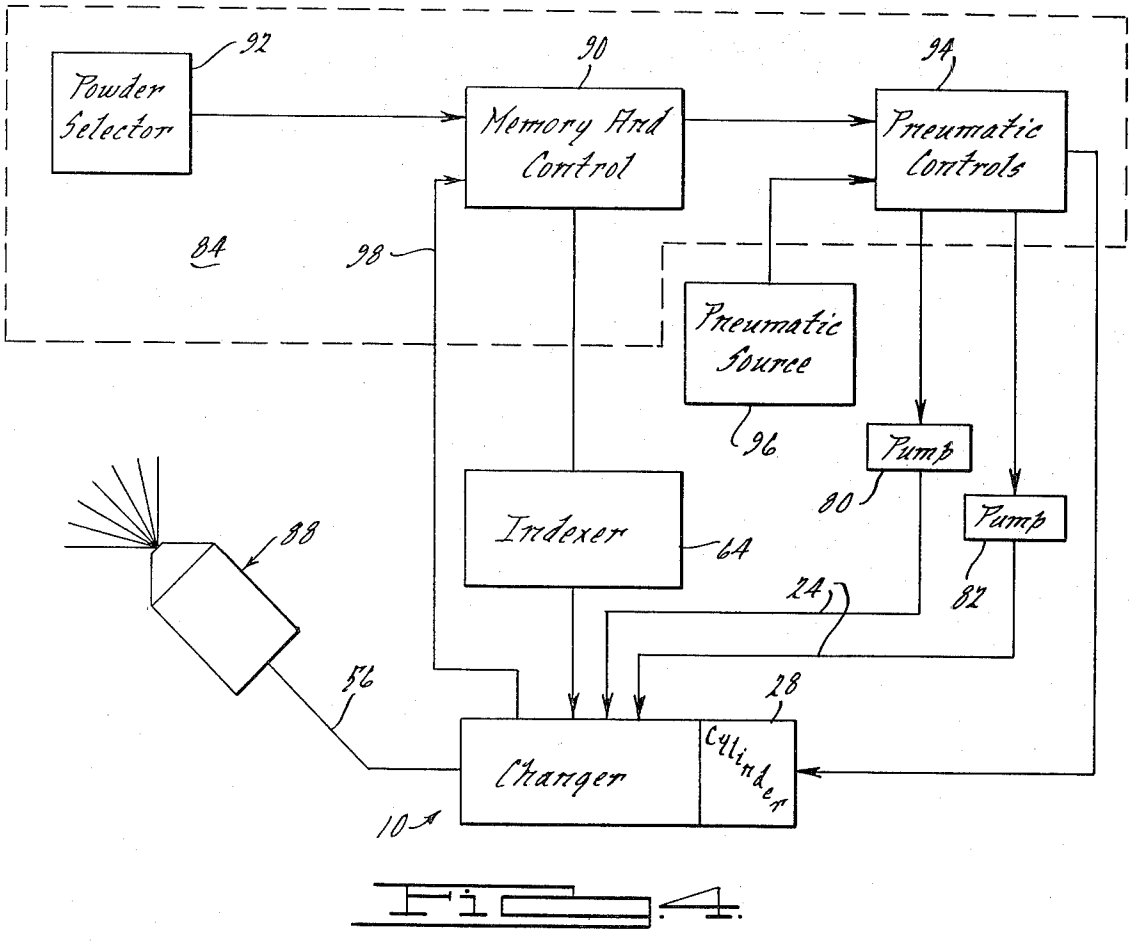

Powder Selector
92
Memory And Control
90
Pneumatic Controls
94
84
98
Pneumatic Source
96
Pump
80
Pump
82
Indexer
64
88
24
56
28
Changer
Cylinder
10

Fig. 4

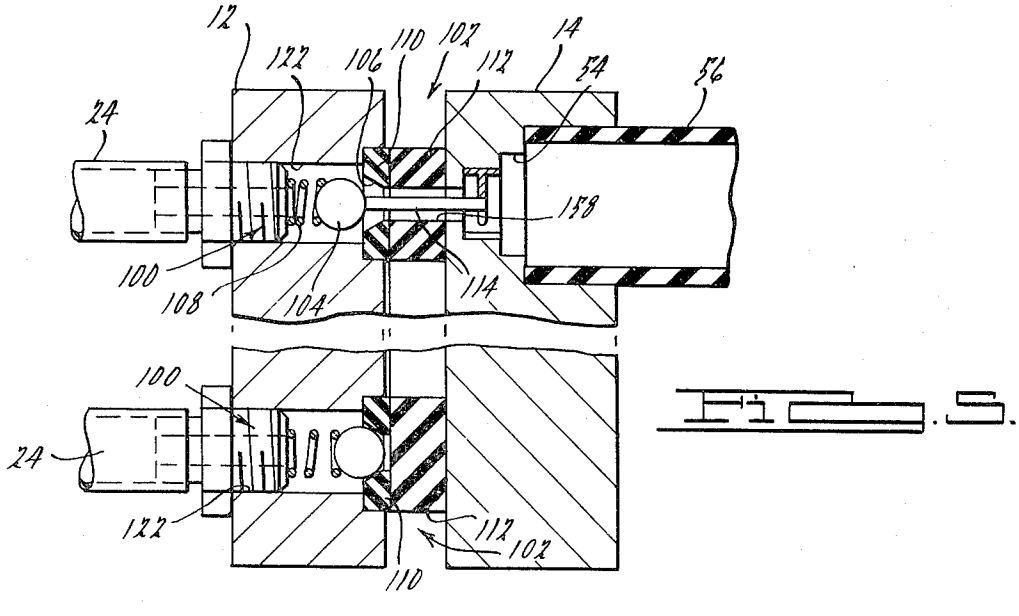

12
122
106
110
102
112
14
54
56
24
158
100
108
104
114
100
24
122
112
102
110

Fig. 5

SPRAYABLE MATERIAL CHANGER APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the field of spray apparatus in general and more particularly to that portion of the above-noted field which is concerned with the spraying of material such as for coatings. The present invention is more particularly directed to that portion of the above-noted field wherein a plurality of materials must be intermittently sprayed in a random sequence fashion and wherein it is highly desirable to avoid any cross contamination of the material. More particularly still, the present invention is directed to apparatus for use in association with an electrostatic powder spray apparatus for providing that powder spray apparatus with communication to a plurality of dry powder sources in a manner which will allow rapid change of powder communication from a first selected powder to a second selected powder and which will avoid any cross contamination of the powder being sprayed with residue from a previous spray operation.

2. Description of the Prior Art

In the spraying of dry powder materials such as film forming coatings on, for example, automotive body panels, it is frequently necessary to have a single spray station spray a different powder coating on each of a succession of body panels. A single spray station may have one or more spray apparatus, typically referred to as spray guns, arranged to spray the material in unison. In order to maintain the speed of the spray assembly operation at a smooth and economically rapid level, it is necessary that the spray apparatus be capable of changing from one sprayable material to another sprayable material in approximately the same amount of time as that required for the successive body panel to come into the range of the spray apparatus. It is therefore a general objective of the present invention to provide a means for changing the material being supplied to a spray station in the time period required for successive parts to enter the spray station.

One way in which this objective may be obtained is to provide each spray material with separate spray apparatus and to automatically change between successive spray apparatus for each successive body panel. However, this is an expensive and awkward solution to the problem in view of the fact that powder coating materials are normally sprayed with an electrostatic charge to facilitate uniform deposition of the uniform coating and the provision of a plurality of spray apparatus would necessitate the provision of a plurality of electrostatic charging devices. Such a solution would also be cumbersome in the sheer bulk of equipment required to be maintained at any one spray station. Furthermore, a safety hazard would be introduced by the additional machinery required to switch between successive spray apparatus and by the necessity of maintaining a large number of electrostatically charged pieces of spray apparatus. It is therefore an object of the present invention to provide a changer for spray apparatus which may intercommunicate a single spray apparatus with a plurality of sprayable material sources.

One mechanism which has been successfully used in the past to achieve the aforementioned objective has been to provide a plurality of powder manifolds each having a spray channel and a powder channel. The manifolds are interconnected to align the spray channel so as to provide a common passage through the manifold. Each powder channel intersects the spray or common passage and communicate with a single material source. Such an apparatus is thereafter controlled by sequential valving situated in the powder channel upstream from the junction of that channel with the spray passage. This valving may open individual powder channels and will concomittently close all other powder channels to prevent any cross contamination. However, such valving apparatus, situated as it must be within the powder channels slightly upstream from the junction of the respective powder channel with the spray channel, provides a small pocket area where residue spray material may accumulate. While it is normally the custom to provide for a flushing operation of the spray channel and of the spray apparatus between successive applications of material by the spray apparatus, the pockets of accumulated spray material are difficult to thoroughly flush and frequently result in contamination of the material being sprayed by a residue of material from a previous spray operation. It is therefore a further and specific object of the present invention to provide a material changer apparatus for use in conjunction with a spray apparatus which may intercommunicate the spray apparatus with a plurality of sprayable material sources and which will prevent any cross contamination of the sprayable material. More specifically, it is an object of the present invention to provide such apparatus which will avoid the formation of accumulation regions downstream from the control valving to thereby avoid the formation of residue of sprayable material.

Still another attempt to solve the above noted problem has been to provide the spray apparatus with a plurality of material supply conduits. The supply conduits are arranged to have each of their exhaust ports aimed or focused to deliver streams of material to be sprayed to the center of a vortex nozzle. This a single material may be supplied from a selected supply conduit and may be sprayed by the apparatus. The spray nozzle may be subsequently communicated to a different supply. This arrangement is size limited in that only a small number of conduits may be arranged to be focussed toward the center of the vortex and is further complicated by the fact that the vortex aiming is critical. It is therefore a further and specific object of the present invention to provide material changer apparatus for a spray apparatus which may communicate that spray apparatus with a large plurality of sprayable material sources or reservoirs. It is a still further and particular object of the present invention to provide such an apparatus in which placement of the means for communicating the changer apparatus with the material reservoirs may be noncritical in use. It is a still further object of the present invention to provide such apparatus which may automatically change the communication of the spray apparatus from a first selected material reservoir to a second selected material reservoir while providing an intermediate flushing action. More particularly still, it is an object of the present invention to provide a changer apparatus which may intercommunicate a plurality of fluidized dry powder sources with an electrostatic spray apparatus which is inexpensive and reliable and which avoids cross contamination of sprayed powders. Other and further objects of the present invention will be apparent from the description which follows and the claims which are appended.

SUMMARY OF THE PRESENT INVENTION

The present invention provides a valving mechanism comprised of a pair of relatively movable plate members. One plate member is arranged to be stationary and the other plate member is arranged for rotary and translatory movement. The stationary plate member is provided with a plurality of passages extending therethrough, one of which may be communicated to a source of flushing fluid and the remainder of which may be communicated to a plurality of reservoirs of sprayable material. The movable plate member is provided with a single passage means which may be arranged to communicate with the spray apparatus on the one side and, through suitable translatory and rotary movement of the plate, with selected ones of the stationary plate passages. Each of the stationary plate member passages may be provided with means defining a gasket seat or ridge surrounding the orifice thereof while the rotary plate member may be provided with means defining sealing structure to cooperate with the gasket seat or ridge provided on the stationary plate member to provide for sealing of each of the stationary plate member passages when the plate members are closely proximate to each other.

In order to achieve the desired translatory movement of the movable plate member, a double acting piston and cylinder means is provided interconnecting the stationary and movable plate members which may be rendered operative to translate the movable plate member toward and away from the stationary plate member. In order to accomplish the desired rotational movement of the movable plate member, a stepping motor means may be provided to rotate the movable plate member clockwise and counterclockwise about an axis so as to align the movable plate member passage means with selected ones of the stationary plate member passage means.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 illustrates a side sectional view of the changer apparatus according to the present invention.

FIG. 2 illustrates an end view of the apparatus of FIG. 1.

FIG. 3 illustrates in a schematic diagram form the present invention as applied to an electrostatic powder coating spray operation.

FIG. 4 illustrates a block diagram for one form of a control system for controlling the material changer apparatus according to the present invention and useful in a system according to FIG. 3.

FIG. 5 illustrates an alternate embodiment of the valve sealing for the changer according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, FIG. 1 illustrates the material changer apparatus **10** according to the present invention. For purposes of illustration, the present invention will be described hereinbelow with reference to the application of various color fluidized powder film forming materials by electrostatic spray deposition methods to automotive vehicle body panels. It will be appreciated that the present invention is applicable to spray apparatus other electrostatic spray apparatus and with sprayable materials other than dry powder film-forming coating material.

Powder changer apparatus **10** is comprised of a stationary plate member **12** and a movable plate member **14** which is supported for rotation about axis **16.** Plate member **12** has a powder supply side **18** and a sealing surface side **20.** Plate member **12** is provided with a plurality of passages **22** which extend therethrough from the powder supply side **18** to the sealing surface side **20.** Each of the passages **22** may be communicated, for example, by means of hoses **24** with a source of fluidized powder and by means of hose **26** with a source of a flushing agent as will be described hereinbelow.

Stationary plate member **12** is connected to the movable plate member **14** by cylinder means **28** which is illustrated as being attached to the powder supply side **18** of the stationary member **12.** Cylinder means **28** includes a double acting piston member **30** situated within the cylinder cavity **32.** Piston **30** is arranged for reciprocating movement within cylinder means **28** and is provided with stub shaft member **34** which extends through the stationary member **12** and is fixedly attached to movable plate member **14.** It will be appreciated that stub shaft member **34** should be provided with some form of pressure retaining sealing between it and stationary plate member **12.** Piston member **30** is arranged to be actuated in the first direction by fluid pressure provided to cylinder cavity **32** through fluid conduit **36** and is arranged to be actuated in a second or opposite direction by fluid pressure provided to cylinder cavity **32** through fluid conduit **38.** Piston **30** is further provided with a pair of seal members **40** which operate to seal each end of the piston **30.** As illustrated, seal members **40** may be, for example, flexible O-rings or such other seal means as are convenient.

The application of fluid pressure through fluid conduit **36** and fluid passage **42** to face **46** of piston **30** is operative to displace piston **30** rightward relative to FIG. **1,** and through its connection to the movable plate member **14** by stub shaft **34,** to cause movable plate member **14** to translate rightwards. The application of fluid pressure through fluid conduit **38** and fluid passage **44** to the right hand face **48** of piston **30,** relative to FIG. **1,** will be operative to cause piston **30** to translate leftward relative to the figure. Due to the interconnection of piston **30,** stub shaft **34** and movable plate member **14,** leftward movement of piston **30** will cause the movable plate member **14** to also translate leftward.

Each of the material supply hoses **24** and the flushing material supply hose **26** is arranged to extend through stationary plate member **12** from the supply side **18** to the sealing surface side **20.** The hoses **24, 26** are terminated in an extending flange portion **50** which generally surrounds the passages **22** of the stationary plate member **12.** Each flange portion **50** is provided with a gasket seat or ridge **52** which may be, for example, a ridge portion formed as a part of the flange portion **50.** Ridge **52** may alsso be a separately embedded member or annulus of suitable material such as metal.

Movable plate member **14** is provided with means defining a single fluid passage **54** which communicates on the one side with spray apparatus supply hose **56** and is arranged to communicate on the other side with a similarly provided passage **58** which extends through cooperating seal element **60.** In a preferred embodiment, cooperating seal element **60** is an annular band of natural rubber material which extends around the periphery of the inner side of movable plate member **14.** Cooper-

ating seal element **60** is provided with a single passage **58** and is therefore operative, when movable plate member **14** is in the extreme leftward position relative to FIG. **1**, to cooperate with the gasket seats or ridges **52**, and the flange portions **50**, of each of the hoses **24, 26** to seal the hoses from the environment. In the case of the selected, here illustrated as hose **26**, which is in fluid communication with spray apparatus supply hose **56**, the sealing action of cooperating seal element **60** and gasket seat or ridge **52** will be to provide for fluid tight communication from the selected one hose **24** and the spray apparatus supply hose **56**.

A second stub shaft **62** is attached to piston **30** so as to extend away from face **46** of piston **30**. This stub shaft **62** extends through cylinder **28** and may be connected, for example, by a sliding spline connection, to a stepping motor **64**. When energized, stepping motor **64** may be arranged to rotate stub shaft **62**, piston **30**, stub shaft **34**, and movable plate member **14**. Thus, when fluid pressure is applied to the face **46** of piston **30** and piston **30** has been displaced rightward so as to displace movable plate member **14** rightward with respect to stationary plate member **12**, energization of stepping motor **64** will be operative to rotatably displace movable plate member **14** with respect to stationary plate member **12**. By arranging the spacing of the steps of the step motor **64** in any of the well known ways, the single passage means **54** of the movable plate member **14** may be aligned with selected ones of the passages **22** so as to permit, upon leftward displacement of the piston **30**, direct communication between the spray apparatus supply hose **56** and the selected one of the material supply hoses **24, 26**.

With reference now to FIGS. **1** and **2** it can be seen that passage means **54** of the movable plate member **14** and the passages **22** of the stationary plate member **12** are arranged to be equidistantly spaced from the axis **16**. Furthermore, passages **22** may be arranged to be angularly equidistantly spaced about the periphery of stationary plate member **12**. As illustrated in FIG. **2**, there are six passages **22** arranged about the stationary plate member **12**. It will be appreciated that the number of passages **22** is dependent only on the size of the passages **22** and the size of stationary plate member **12**. It can also be seen that the stationary and movable plate members **12, 14** preferably are of circular configuration. It will be appreciated that, while reference is made herein to the passages **22** as being individual passages and passage **54** has been referred to as a single passage, passage **54** could be a plurality of passages in any desired configuration, each of which could be communicated to one of a plurality of spray apparatus supply hoses. The passages **22** of stationary member **12** could be similarly arranged and configured and could communicate with a plurality of hoses **24, 26** each of which would then communicate with a reservoir of sprayable material. The advantage of this arrangement would be to permit the supply of a single sprayable material to a plurality of spray nozzles as may be used for example to apply coatings to a large surface area when a single spray apparatus would not have sufficient delivery capability.

Referring now to FIG. **3**, the changer apparatus **10** according to the present invention is illustrated as applied to a powder paint spray apparatus operation utilizing an electrostatically charged powder spray apparatus **66**. Powder spray apparatus **66** is electrostatically charged from electrostatic charging means **68** through conductors **70**. Electrostatic charging apparatus **68** is illustrated as being energized from a conventional AC electrical source through electric line cord **72**. Electrostatic powder spray apparatus **66** is operative to provide a spray of electrostatically charged powder coating material to the surface of a member to be coated, shown as **74**. As is well known, the powder paint material will be uniformly distributed and will adhere to member **74** through the action of the electrostatic charge. In the spray coating of automobile bodies, for example, as discussed hereinabove it is frequently necessary that successive spray applications of material to successive body panels be of differing colors. In order to facilitate a rapid and contamination-free change of the powder being provided to the powder spray apparatus, the changer of the present invention is arranged to communicate with a plurality of reservoirs of fluidized powder coating material through a plurality of connecting hoses **24**. For example, FIG. **3** illustrates a pair of connecting hoses **24** being communicated to reservoirs **76, 78** each of which contains a fluidized bed of powder material of differing colors and a venturi-type powder pump **80, 82**. A pneumatic fluid line **90** extends from the control system **84** to each of the powder pumps **80, 82** for providing an energizing fluid flow for the selected material. In addition, hose **26** may be communicated to a source of flushing agent. One convenient flushing agent is shop air which may be used to purge the hoses and passages downstream from the changer apparatus between successive applications of powder coating material.

In operation, the present invention functions as follows. A flushing agent such as shop air is communicated through hose **26** and through the appropriate passages of the changer apparatus **10** to the spray apparatus supply hose **56** and the spray apparatus **66**. After a sufficient period of time has elapsed to assure that all residue powders have been exhausted from the spray apparatus supply passage **56** and from the spray apparatus **66**, the control system **84** will command the application of fluid pressure, which may also be shop air, to fluid conduit **36** and the face **46** of piston **30** to cause movable plate member **14** to translate rightward, relative to FIGS. **1** and **3**, away from the stationary plate member **12**. Proximity sensor switch **86** will respond to plate **14** reaching the extreme rightward position so that stepping motor **64** may be actuated to rotatably displace movable plate member **14**. Step motor **64** may be arranged to rotate clockwise and/or counterclockwise a predetermined angular distance to align passage **54** with a selected one of the passages **22** so that upon application of fluid pressure to passage **38** and face **48** of piston **30** and leftward displacement of rotatably plate member **14**, the spray apparatus supply hose **56** will be placed in fluid communication with the selected one of the powder hoses **24** and its associated material reservoir so that the application of the appropriate powder coating material to the next successive body panel **74** may be achieved. Upon leftward displacement of movable plate member **14**, proximity sensor switch **86** will inform the control system **84** that leftward displacement has been achieved and the material reservoir powder pump for the selected material may be energized. Due to the dual sealing action of the inter-plate sealing means **50, 60** powder supplied from the one selected powder reservoir **76, 78** which communicates directly with the spray apparatus supply hose **56** will be prevented from entering and accumulating in the pas-

sages 22 which communicate with the nonselected reservoirs. After the passage of an amount of time selected to correspond with the rate of travel of the body panel 74 on the conveyor apparatus past the nozzle 88 of spray apparatus 66, the control system 84 will depressurize the powder pump in the reservoir of the selected material and the movable plate member 14 will be automatically indexed to place the spray apparatus supply hose 56 in communication with the flushing agent supply hose 26 so that residue powders may be exhausted from supply hose 56 and from the spray apparatus 66. In the preferred embodiment, the flushing agent may be pressurized shop air but alternatively, the spray apparatus 66 and supply hose 56 may be flushed by a vacuum operation in which the powders which act as residue within the spray apparatus and the spray apparatus supply hose may be collected and returned to the respective fluid supply reservoirs 76, 78.

Referring now to FIG. 4, a representative control system 84 for controlling the sequence of operation of the changer apparatus 10 according to the present invention is illustrated. In the illustrated control system, the principal element of the control is the memory and electrical sequence signaller 90 which may be, for example, an Edon Memo-Chain control mechanism having memory capability. This central processing unit 90 receives material selection indications from the powder selectro 92 and applies suitable control signals to the pneumatic control means 94. Unit 90 also applies suitable electrical signals to indexer 64 to accomplish clockwise or counterclockwise stepping motion when switching from one of the selected passages 22 of stationary plate member 12, to the flushing position, and to a second selected passage 22 of the stationary plate member 12. Pneumatic control means 94 receives pneumatic fluid, which may also be shop air, under pressure from pneumatic source 96. Pneumatic control means 94 may be comprised, for example, of suitable electromechanical valve means for controlling the application of pneumatic pressure to a selected pumping means 80, 82, for example and to control actuation of the cylinder means 28. Material to be sprayed would therefore be pumped by pump means 80, 82 through the associated material supply hose 24 to changer 10. This material would be delivered to spray apparatus supply hose 56 to be sprayed from nozzle 88. The lateral position of movable plate member 14 relative to stationary plate member may be communicated from switch member 86 to central processing unit 90 by conductor means 98.

Referring now to FIG. 5, a fragmentary view of a portion of the stationary and rotary plate members 12, 14 according to the present invention and showing an alternate valving and sealing mechanism is illustrated. According to the structure of FIG. 5, each of the passages 22 of the stationary plate member 12 is provided with a displaceable check valve means 100 and a separate sealing means 102. In the illustrated embodiment, the check valve means is comprised of a ball member 104 which is urged toward a seat 106 by resilient means 108. Valve seat 106 is provided in combined valve seat and seal member 110 which may be formed of a resilient material. Movable plate member 14 is similarly provided with a complementary seal forming member 112 which is arranged to coact with the member 110 to provide a fluid tight seal between the passage 122 of stationary member 12 and the passage means 54 of the rotary member 14. As illustrated in the FIG. 5 embodiment, cooperating sealing member 12 is provided with a central aperture 158 which is aligned with the similarly provided aperture within the seal member 110.

Passage 54 is further provided with means defining a check valve displacing element, finger 114, which is situated within passage means 54 and arranged to project outwardly from the movable member 14 so as to engage, and displace, the ball member 104 of the check valve means 100. In the illustrated embodiment, each of the passages 122 of the stationary member 12 is provided with a combined valve seat and seal member 110. The cooperating seal member 112 is here illustrated as being an annular member arranged about the periphery of movable plate member 14 and which is radially spaced so as to engage the cooperating seat forming member 110. As illustrated, seal member 112 possesses but a single aperture 158.

It will be appreciated that the present invention readily accomplishes its stated objectives. By providing structure which is situated between the confronting faces of the stationary and rotary plate members, double sealing is provided to 1) provide a fluid tight seal between the spray apparatus supply hose 56 and the selected supply passage of the stationary plate member in communication with hose 56 while 2) sealing the nonselected supply passages of the stationary plate member from any contamination which might be inadvertently introduced into the region between the plate members 12, 14 from the operation of changer 10. Furthermore, the present invention provides a mechanism by which any residual powders remaining within the spray apparatus supply structure may be exhausted so as to avoid any contamination forming residues when switching from a spray operation involving a first sprayable material to a spray operation involving a second sprayable material which may be incompatible with the first sprayable material because of color or other differences. By the rather direct expedient of enlarging the diameter of the stationary and rotary plate members and by suitably arranging the indexing means 64 to accommodate for different sizes and different angular spacings between the stationary plate member passages, an indefinitely large number of different sprayable materials may be communicated to a single spray apparatus while avoiding the risk of contamination between different sprayable materials and assuring the availability of a flushing action when switching between two dissimilar and incompatible sprayable materials. Furthermore, multiple spray apparatus may be provided by utilizing multiple porting and multiple supply hoses.

While my invention has been described with reference to a particular utilization and specific exemplary structure has been described, the practitioner will recognized that certain modifications may readily be made. For example, the changer apparatus may be used with material supplies which are not fluidized and need not be limited to use with powders. The translatory and indexing structure may be constructed to provide a nonrotary piston member sealingly coupled to a single through shaft with the shaft being slidingly splined to either the movable plate or the indexer, or the shaft may be fixedly attached to both with the indexer being slidingly and nonrotarily coupled to the stationary plate member.

I claim:

1. Apparatus for communicating a powder spray gun with a plurality of fluidized powder sources while

avoiding cross contamination of powders comprising in combination:

a stationary plate member having a powder side and a sealing side, a plurality of powder passages and at least one flushing passage, said passages extending through said plate from the powder side to the sealing side;

hose means coupled to said powder passages on the powder side of said plate for fluid-tight communication of said powder passages with the plurality of powder sources;

further hose means coupled to said at least one flushing passage on the powder side of said plate;

means coupled to said further hose means for flowing a flushing medium therethrough;

plate valve means supported in closely spaced relation to said stationary plate member and having a flow passage means extending through said plate valve means and aligned for fluid communcation with said powder passage and said at least one flushing passage;

hose means coupled to said flow passage means for communicating said flow passage means with the spray gun;

means connected to said valve plate means for varying the spatial relation between said valve plate means and said stationary plate member;

indexing means operative to align said flow passage with a selected one of said powder and flushing passages;

seal means interposed between said stationary plate member and said valve plate means operative to provide sealed communication between said flow passage and said selected one of said powder and flushing passages;

said plate valve means comprising a plate member mounted for rotation about an axis, said rotation axis being arranged to extend through the stationary plate member, and said spatial relation varying means comprise cylinder means interconnecting said stationary plate member and said plate valve means actuable to increase the spatial relation to a first predetermined amount and to decrease the spatial relation to a second predetermined amount; and

said indexing means comprising step motor means operative when the spatial relation between the stationary plate member and the valve plate means is at the first predetermined amount to rotate said valve plate means about said axis until said flow passages is aligned with the selected one of the powder and flushing passages and to actuate said piston means to establish a spatial relation of the second predetermined amount.

2. The apparatus of claim **1** including control means to automatically and sequentially operate the piston means and the indexing means to communicate different selected ones of the powder passages with the flow passage and to communicate the flow passage with the flushing passage between successive different powder passage communications.

3. Apparatus for communicating a powder spray gun with a plurality of fluidized powder cources while avoiding cross contamination of powders comprising in combination:

a stationary plate member having a powder side and a sealing side, a plurality of powder passages and at least one flushing passage, said passages extending through said plate from the powder side to the sealing side;

hose means coupled to said powder passages on the powder side of said plate for fluid-tight communication of said powder passages with the plurality of powder sources;

further hose means coupled to said at least one flushing passage on the powder side of said plate;

means coupled to said further hose means for flowing a flushing medium therethrough;

plate valve means supported in closely spaced relation to said stationary plate member and having a flow passage means extending through said plate valve means and aligned for fluid communication with said powder passages and said at least one flushing passage;

hose means coupled to said flow passage means for communicating said flow passage means with the spray gun;

means connected to said valve plate means for varying the spatial relation between said valve plate means and said stationary plate member;

indexing means operative to align said flow passage with a selected one of said powder and flushing passages;

seal means interposed between said stationary plate member and said valve plate means operative to provide sealed communication between said flow passage and said selected one of said powder and flushing passages; and

seal means interposed between said stationary plate member and said plate valve means operative to seal closed the nonselected ones of the powder and flushing passages;

said seal means comprising

a. a plurality of first seal element means situated on said stationary plate member in proximity to the sealing side thereof and arranged to be in surrounding relation to the sealing side orifice of each of the powder and flushing passages and

b. means defining second seal element means positioned on said plate valve member in juxtaposed relation to the plurality of first seal element means, the second seal element means including a passage means aligned with the flow passage means of the plate valve means to provide unrestricted material flow through from a selected one of the powder and flushing passages to said flow passage means.

4. The apparatus of claim **3** including further a plurality of check valve means situated in the powder passages and having orifices extending from the seal side of the stationary plate member toward the valve plate means, and valve operating means extending from the flow passage, operative to engage and open the check valve means situated in the selected one of the powder and flushing passages.

5. The apparatus of claim **4** wherein each of said check valve means comprise displaceable ball valve member, means resiliently biasing said ball valve member toward a valve seat and said valve operating means comprise a projecting finger element situated in the flow passage means of said plate valve means.

* * * * *