United States Patent [19]

Fuss

[11] **3,708,208**

[45] **Jan. 2, 1973**

[54] SYSTEM FOR SELECTIVE DISTRIBUTION OF LIGHT WEIGHT MATERIALS

[75] Inventor: **Gunter G. Fuss,** Daly City, Calif.

[73] Assignee: **Free-Flow Packaging Corporation,** Redwood City, Calif.

[22] Filed: **Nov. 2, 1970**

[21] Appl. No.: **86,112**

[52] **U.S. Cl.** **302/28**

[51] **Int. Cl.** **B65g 53/04**

[58] **Field of Search** .222/193, 189; 302/28; 239/346; 19/105 CF

[56] **References Cited**

UNITED STATES PATENTS

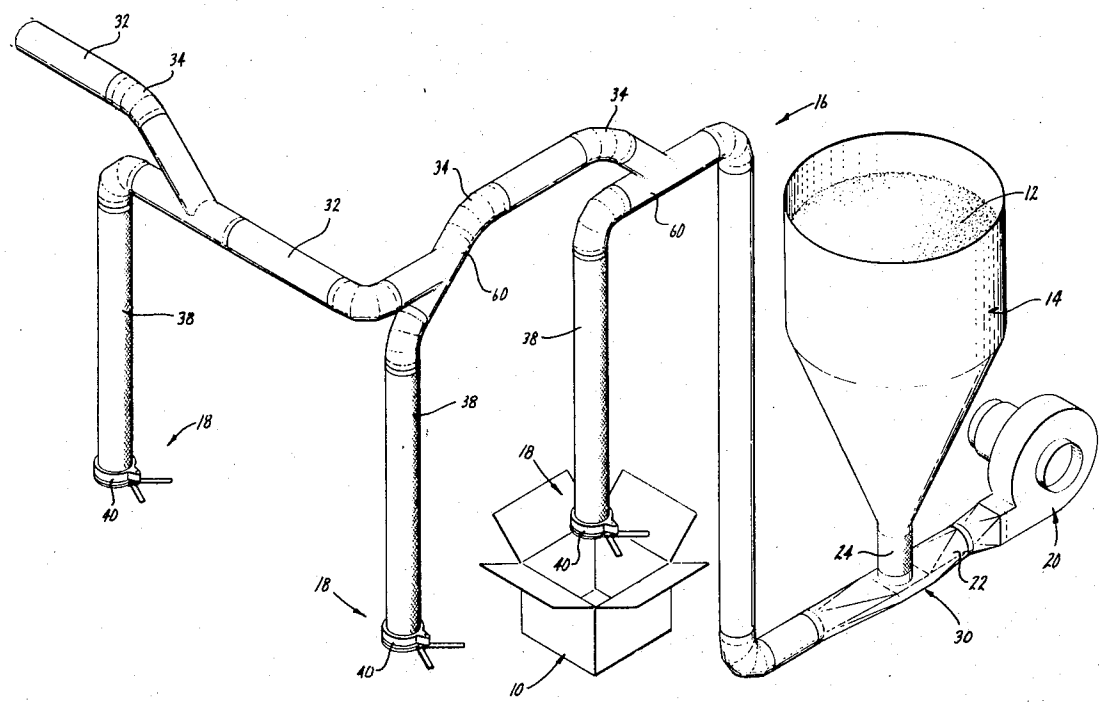
1,597,438	8/1926	Ennis	302/28
3,520,447	7/1970	Hawk, Sr.	222/193 X
3,332,582	7/1967	Tills	222/193 X
898,689	9/1908	Sawyer	222/503

Primary Examiner—Stanley H. Tollberg
Attorney—Flehr, Hohbach, Test, Albritton & Herbert

[57] **ABSTRACT**

A system (method and apparatus) for rapidly and selectively conveying and distributing light weight materials in subdivided free flowing form. The system operates in conjunction with blower and air dissipating means to selectively deliver predetermined amounts of light weight materials to various remote distribution outlets associated with a generally closed air conveyance system. The system makes use of volumetric air dissipating means at each such outlet which operate both to discharge predetermined amounts of the subdivided light weight materials at such outlets and to replace from a central source only the amounts of material discharged. The system has utility in the distribution of predetermined amounts of subdivided materials (e.g., cushioning and packaging materials, dry cereals, chemicals and similar light weight materials) to localized filling and packaging operations.

16 Claims, 9 Drawing Figures



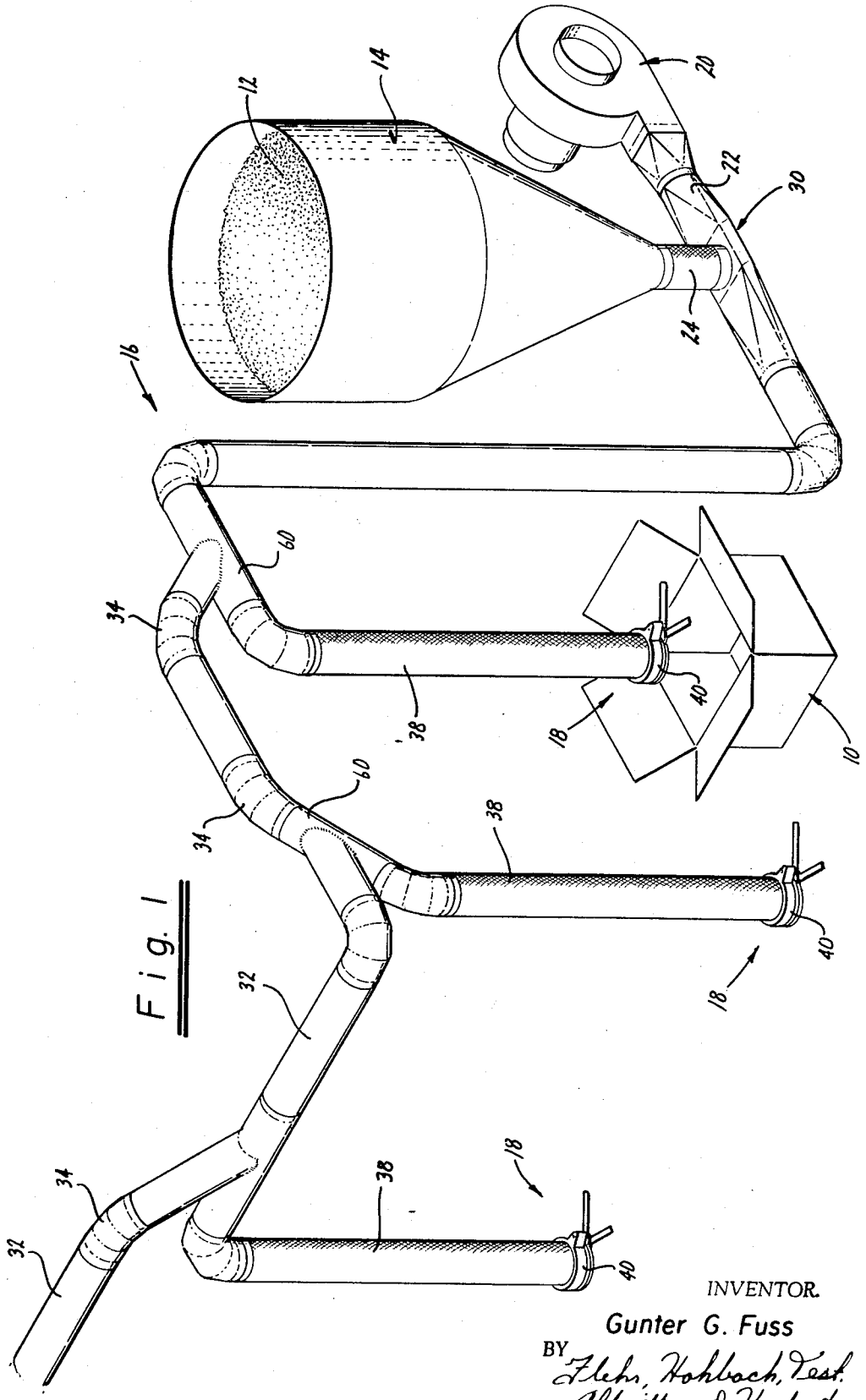


Fig. 1

INVENTOR.
Gunter G. Fuss
BY Flehr, Hohbach, Test, Albritton & Herbert
Attorneys

Fig. 9

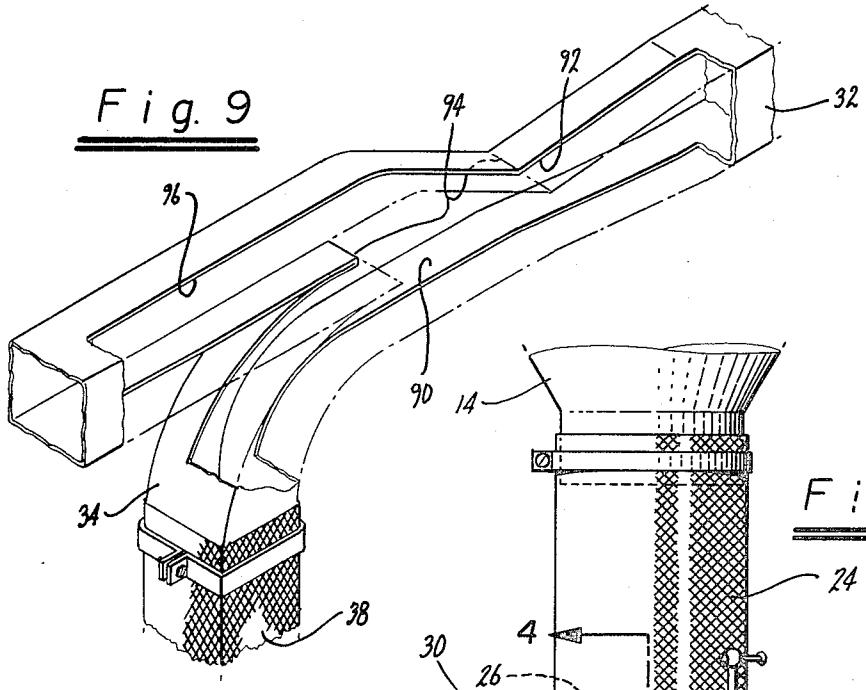


Fig. 2

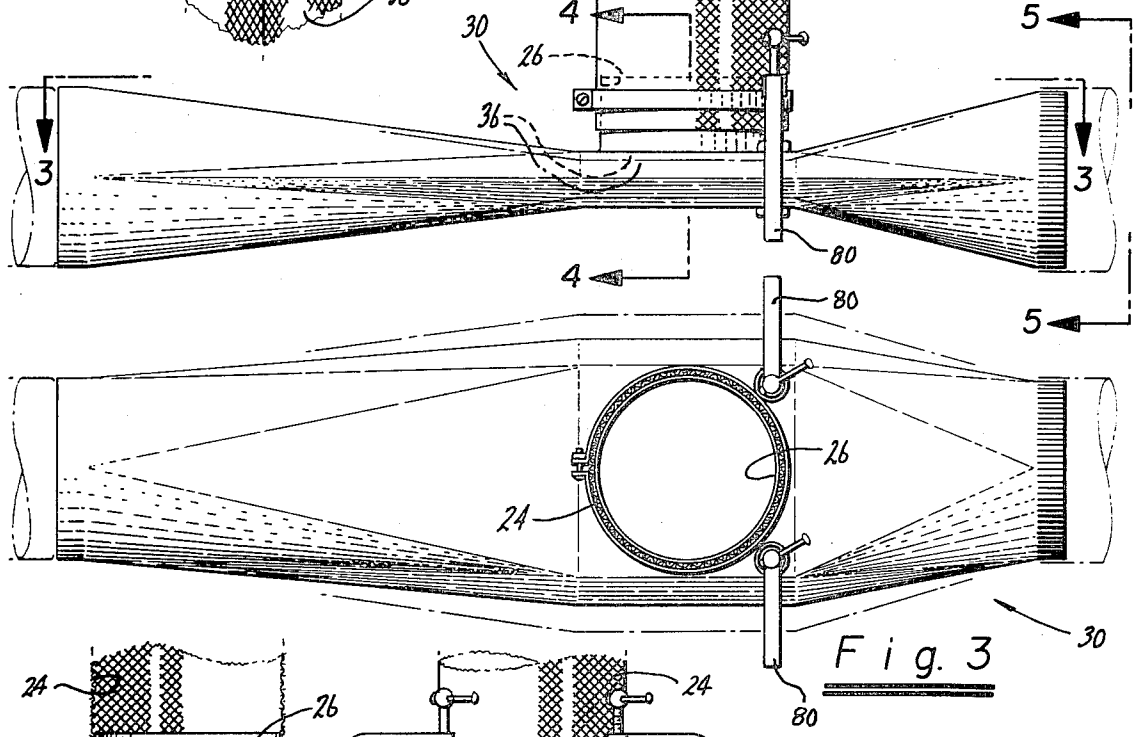


Fig. 3

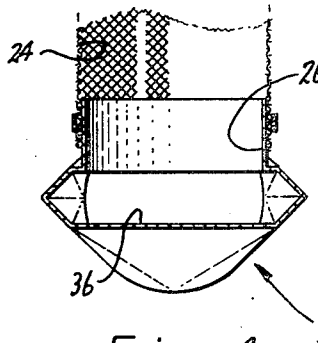


Fig. 4

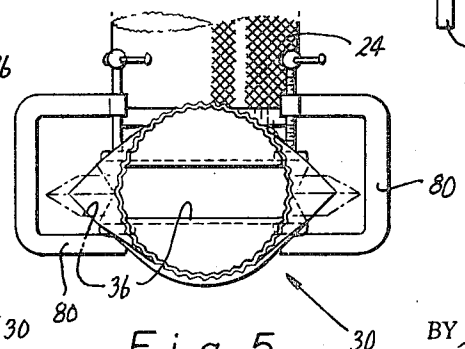


Fig. 5

INVENTOR.
Gunter G. Fuss
BY Flehr, Hohbach, Test, Albritton & Herbert
Attorneys

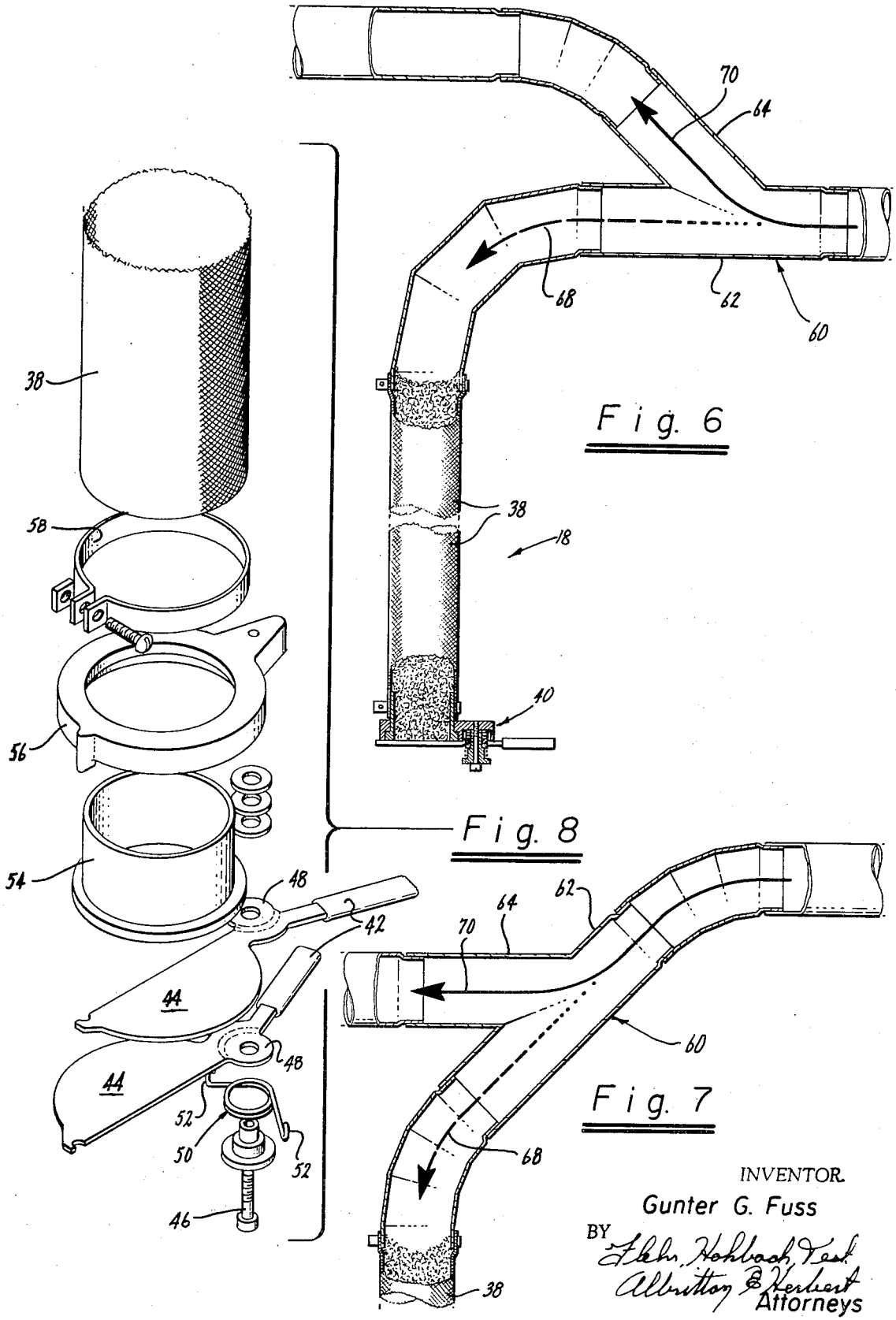


Fig. 6

Fig. 8

Fig. 7

INVENTOR.
Gunter G. Fuss
BY
Flehr, Hohbach, Test
Albritton & Herbert
Attorneys

SYSTEM FOR SELECTIVE DISTRIBUTION OF LIGHT WEIGHT MATERIALS

BACKGROUND OF THE INVENTION

This invention relates generally to methods and apparatus for the rapid conveyance and selective distribution of subdivided light weight materials and more particularly to methods and means making possible the rapid selective distribution of predetermined amounts of light weight subdivided materials at desired localized distribution outlets.

The present invention has particular application in the conveyance and selective distribution of free-flowing cushioning and packaging materials of the type disclosed, for example, in the U. S. Pat. Nos. 3,074,543, 3,188,464, 3,400,037, and 3,481,455. Cushioning and packaging materials of the type disclosed in these patents are formed of a foamed expanded plastic material with a unit size and shape adapted to facilitate a free-flowing characteristic. Such cushioning and packaging materials are very light in weight, having a bulk density of the order of 0.5 to 1.0 pounds per cubic foot and ranging from about 0.3 to 4.5 pounds per cubic foot. Such materials are consequently not easily conveyed as they have insufficient bulk to effect rapid effective conveyance and distribution by conventional means such as endless conveyors and the like. The extreme light weight of such materials also presents problems in conjunction with proposals for fluid or air conveyance due to a susceptibility to channeling or blow through of the pressurized gas used as a conveyance medium (e.g., compressed air). A further problem is presented by the difficulty of delivering predetermined amounts of such materials to a specified packaging or filling operation, particularly where such packaging and filling operations are at widely dispersed points in a plant operation.

SUMMARY OF INVENTION AND OBJECTS

Generally stated, the present invention is directed to a method and means for the rapid selective delivery of predetermined volumes of light weight subdivided materials from a central source whereby controlled amounts of such materials can be selectively conveyed to widely spaced individual distribution outlets. Broadly, the method of the present invention makes use of alternative operating conditions or stages. In a first stage, static equilibrium or "hold" conditions are created with respect to a supply of light weight material to be distributed and a source of conveyance gas under pressure. The conveyance gas is continuously introduced from the pressure source to a generally closed conveyance system, adjacent to which is positioned a relatively large supply of the light weight material. The flow of conveyance gas is vented or dissipated at a point beneath the material supply to thereby create a positive gas pressure which normally holds the light weight material in a suspended or "rest" position for subsequent feeding into the conveyance system. In a second or "demand" stage, a substantial portion of the conveyance gas is diverted to a desired distribution outlet in the closed system so that the positive gas pressure is converted to negative gas pressure (i.e., suction) which causes part of the supply of light weight material to be drawn into the conveyance system. The latter is thus freed for conveyance in the closed system and discharge at the point of diversion adjacent the selected distribution outlet.

The method of the present invention is particularly adaptable to plant operations where it is desirable to distribute a predetermined quantity of a light weight subdivided material (e.g., foamed expanded plastic cushioning and packaging material) to a remote packaging or filling operation.

Apparatus for carrying out the foregoing method generally comprises a closed conveyance system in communication with means to effect the desired fluid conveyance (e.g., a blower) together with a hopper or other means to contain a supply of the light weight material. The hopper has a screened outlet which functions to dissipate the flow of air from the blower and also to create a positive gas pressure which holds the light weight material in supported or suspended relation within the hopper. The closed circulatory system is further provided with one or more distribution outlets which function to effect a controlled conveyance and discharge of predetermined volumes of the light weight material at points remote from the hopper. To this end the portion of the conveyance system adjacent the hopper outlet can be formed as a flattened venturi of variable cross section, such construction providing control of the negative pressure inducing flow of the light weight material to a particular remote distribution outlet. In a preferred embodiment, each of the distribution outlets comprises an elongate section of screening material of an area substantially greater than that of the screened hopper outlet, and of a volume substantially equilvalent to the volume of material to be discharged. As hereinafter explained in detail, the distribution system and method of the present invention makes possible a rapid selective distribution of predetermined volumes of the light weight material, on demand, at each distribution outlet. The apparatus thus includes additional means to insure that the material withdrawn from the hopper will be delivered only at a selected distribution outlet and not bypass such outlet in favor of a more remote distribution outlet.

It is a general object of the present invention, therefore, to provide an improved method and means for the rapid selective distribution of predetermined volumes of light weight subdivided materials to remote distribution outlets, for example in packaging, filling or like plant operations.

Another object is to provide a relatively simple, inexpensive, highly effective means for carrying out the method of the present invention.

A further object of the invention is to provide a method and means of such character capable of use with a wide variety of light weight subdivided materials.

Another object of the invention is to provide an improved method and means of such character that does not require complicated procedures or machinery, and which is adaptable to virtually any present-day system for air conveyance of light weight materials.

Another object of the invention is to provide an improved system for accomplishing the selective delivery of light weight subdivided materials which can be rapidly and effectively employed by a single operator, moving between widely spaced distribution outlets.

Additional objects and advantages of the invention will appear from the following description in which the

preferred embodiments have been set forth in detail in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic representation of a system of apparatus which may be used in carrying out the invention.

FIG. 2 is an enlarged view in side elevation of a portion of the apparatus of FIG. 1, illustrating a particular feature thereof.

FIG. 3 is a view in horizontal section along the line 3—3 of FIG. 2.

FIG. 4 is a view in transverse section along the line 4—4 of FIG. 2.

FIG. 5 is a like view along the line 5—5 of FIG. 2.

FIG. 6 is a view in section and elevation of another portion of the apparatus of FIG. 1, illustrating a further feature thereof.

FIG. 7 is a like view, illustrating a further portion of the apparatus of FIG. 1.

FIG. 8 is an enlarged exploded view, in perspective, illustrating details of a particular distribution device useful in carrying out the present invention.

FIG. 9 is a view partly in section, illustrating another embodiment of portions of the apparatus shown in FIGS. 1 and 6.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the drawings, FIG. 1 illustrates a particular system of apparatus in accordance with the present invention. As noted above, the apparatus is particularly useful in the selective conveyance and distribution of predetermined amounts of light weight cellular packing materials (e.g., foamed expanded polystyrene) and similar light weight materials, for example, in plant filling and/or packaging operations.

Assuming a plant distribution operation involving the filling of cartons 10 with a light weight packaging and cushioning material 12, the system operates to feed the material from a suitable hopper 14 through a closed conveyance system 16 to one or more distribution outlets generally represented at 18. Air pressure for conveyance of the light weight material is generated by a blower or other suitable device 20, which continuously introduces air under pressure to the upstream or inlet side of the closed circulatory system, generally represented at 22.

Referring specifically to FIG. 1, the hopper 14 may be formed of any suitable material, depending to some extent on the nature of the light weight material 12 being distributed. Thus, in conjunction with foamed expanded polystyrene packaging materials, the hopper can be formed of canvas, duck, or similar light weight fabric. In the case of light weight chemicals, the hopper can be formed of inert plastic material, sheet metal, or other rigid or semi-rigid material. When appropriately filled with a substantial quantity of the material 12, the hopper 14 provides a source of supply of light weight material for distribution through the closed conveyance system 16.

It is a feature of the invention that the hopper 14 is provided with a screened discharge outlet or vent section 24 which functions to normally dissipate the air pressure generated by the blower 20. As will be understood, the blower 20 produces a positive air pressure in the closed system 16 which tends to induce an upward flow of air within the vent section 24. However, this upward flow is dissipated by venting to the atmosphere through the screen section 26, which may be formed of suitable screening material such as cloth, plastic or metal screening. During such operation, the weight of the material 12 in the hopper produces sufficient back pressure that the screen outlet 26 serves to divert and reduce the upward pressure of the air flow, thereby preventing blow-through or channeling of air from the blower through the material in the hopper. As a consequence, the light weight material in the hopper is held and supported in a "rest" position above the screened outlet section 24 by the gentle upward pressure of the gases dissipating outwardly through the section 26 (FIG. 2).

As best illustrated in FIGS. 2 through 5, the screened outlet 24 is preferably in fluid communication with a flattened venturi section 30, forming a part of the closed conveyance system 16. As hereinafter described, the flattened venturi 30 functions, upon demand, to induce a negative air pressure (i.e., suction) within the hopper outlet 24, making possible the discharge of relatively large volumes of light weight material into the closed conveyance system 16.

As represented in FIG. 1, the conduits 32 and elbow connections 34 of the conveyance system may have a circular cross-section, thus facilitating use of commercially available components (e.g., fabricated of sheet metal, plastic, etc.). However, it will be appreciated that a conventional venturi restriction of circular cross-section would greatly reduce the internal dimensions of the screened outlet section 24, and thus undesirably restrict the volume of material capable of being gravity fed into the closed conveyance system 16. In the illustrated apparatus, this problem is overcome by the use of a flattened venturi restriction 36 which, as best seen in FIGS. 3 and 6, permits a much larger diameter connection between the hopper outlet 24 and the venturi 30. The flattened cross-section of the venturi also facilitates the passage of relatively high volumes of conveying air through the venturi restriction 36.

As noted previously, the closed circulatory system 16 is provided with a series of remote distribution outlets 18. As particularly illustrated in FIGS. 1 and 6, each of these distribution outlets comprises an elongate conduit 38 formed of screening means and terminating in a valved discharge outlet 40. The elongate conduit sections 38 functions generally as air dissipating, dispensing reservoirs of desired predetermined volume, which may be selectively discharged by operation of a particular valve means 40. Thus, assuming that a selected distribution outlet 18 contains a charge of light weight material within the screened portion 38, for example as in FIG. 6, operation of the discharge valve 40 will cause the entire contents of the conduit 38 to fall by gravity into the container 10. However, as a result of such operation, the screened section 38 will function immediately to dissipate air pressure from the blower and to induce a high volume of air flow through the restricted venturi section 30. This, in turn, produces a low or negative pressure zone within the discharge outlet 24 of the hopper, which causes a relatively large volume of light weight material to 12 to be sucked downward through the outlet 24 into the rapidly mov-

ing air stream within the venturi restriction **36**. The material passing from the hopper into the venturi restriction is rapidly conveyed by the pressure of the blower through the conduit sections **32**, **34** to the empty screen section **38**. This operation continues at a rapid rate until the light weight material again fills the screen section **38**, thus preventing the continued dissipation of air pressure through the screened portion **38**. The flow of conveyance air thus being blocked by the new charge of light weight material within the screened section, the system reverts to its previous or "normal" state, wherein the air pressure from the blower is again dissipated through the screened hopper outlet **24**. At this point, the light weight material remaining in the hopper **14** is again held and supported in a "rest" position by the flow of air dissipating through the outlet **26**.

From the foregoing, it will be apparent that the construction of the distribution outlets **18** permits a rapid selective delivery of predetermined volumes of the light weight material, as may be desired, from any one (or more) of the distribution outlets **18**. In this regard, each of the elongate screen sections functions as a "reservoir" for a charge of material of preselected volume. At such time as a screened outlet section **38** is opened to the surrounding atmosphere, due to discharge of its contents, the blower **20** will immediately function to deliver a new charge to such section until it again is full. This operation of the blower in conjunction with the feed hopper **14** will continue so long as any of the distribution outlets **18** are in use, for example in a filling and/or packaging operation.

To facilitate rapid delivery of a charge of packaging materials or other light weight materials through the distribution outlets **18**, it is desirable that the valve means **40** be adapted to rapid operation by a single operator. In the illustrated apparatus, the valve means is of the scissors type operates upon squeezing the opposed handles **42** together to discharge the contents of the screen section **38**. As shown in the exploded detail view of FIG. **8**, the valve **40** may comprise a pair of half valve segments **44** which are mounted in coplanar relationship with respect to pivot pin **46** by means of offset pivot mounts **48**. The valve segments **44** are normally biased into a position of mating, coplanar contact by means of a torsion spring **50**. The latter is mounted on the pin **46** and has upstanding ears **52** which, for such purpose, engage the outer edges of the opposed valve segments **44**. In a rest position, the valve segments **44** are held in closed position beneath the cylindrical discharge orifice **54** which is mounted and held on the valve plate **56**. The screen sections **38** are secured between the end of the plate **54** and air conveyance system by any suitable means, such as conventional clamp members **58**. It will be appreciated that a squeezing pressure to bring the valve handles **42** together will swing the valve segments **44** apart, against the pressure of the torsion spring **50**. Such operation can easily be accomplished by the operator, using only one hand so that the other hand is free to move the carton **10** into position, or to perform other operations. Opening the valve **40** will operate to discharge all or part of the contents of the screened section **38**, as may be desired by the operator.

As noted, opening of the valve **40** immediately acts to uncover at least the upper portion of an elongate screened conduit **38**, thereby releasing the air pressure within the closed conveyance system at such point. The release of air pressure immediately causes the light weight material in the hopper **14** to be conveyed by the blower to the point of pressure release. To insure that such material flows directly to the point of discharge, the interconnecting or branching conduits **60** between the separate distribution outlets **18** are constructed to provide an axial, non-branching flow of material to the discharge outlet. Thus, as particularly shown in FIGS. **6** and **7**, the interconnecting conduit **60** is provided with a main or axial portion **62** and a branching portion **64**. Upon operation of valve **40** to cause dissipation of air through the screen section **38**, the movement of conveying air will naturally follow the direct path along the axial conduit portion **62**, as represented by the arrows **68**. Consequently, adjacent the point of discharge there will be little tendency for the light weight material to move into the branching conduit portion **64**. However, where a more distant discharge outlet is actuated, as suggested in FIGS. **6** and **7**, the movement of conveying air will naturally follow the branching conduit **64** as represented by the arrows **70**. In this way, the system acts to insure the maintenance of predetermined volumes of the light weight material in each of the discharge sections **38**.

Since the degree of negative pressure (suction) at the venturi restriction **36** will depend on the cross sectional area at this point, means are provided to vary and thereby adjust the cross sectional area of the venturi. As particularly illustrated in FIGS. **2** through **5**, such means may simply comprise one or more adjustable clamps or like means **80** which squeeze and reduce the cross sectional area of the venturi restriction. Thus as will be readily apparent from the dotted line configuration of FIGS. **2**, **3** and **5**, the flattened cross section represents a substantial reduction in area as respects the original or full line configuration. In general, the negative pressure of suction required within the venturi for satisfactory conveyance will depend upon the overall size and volume of the conveying system itself (i.e., the size or diameter of the conduits **32**, **34**, the number of dispensing stations **18**, the distance to and between separate stations, and so on). Thus by adjustment of the clamp means **80**, or other suitable means, any desired amount of negative pressure can be obtained as may be necessary for a particular conveyance system **16**.

The operation of the above described system of apparatus can be summarized as follows:

The blower **20** (which functions as a source of gas under pressure) discharges conveyance air at relatively high volume through the venturi restriction **30** to the dissipating screen of the hopper outlet **24**. Through start up and prior operation of the closed conveyance system **16**, each of the elongate sections **38** at the distribution outlets **18** is full of light weight packaging material **12**, thus preventing dissipation of appreciable volumes of conveyance air through these screened reservoirs. However, upon operating one of the scissors-type discharge valves **40**, to discharge the volume of a section **38** to a localized packaging operation, etc., the downward movement of the material allows con-

veying air to be rapidly dissipated through the uncovered portions of the particular screen-section **38** being discharged. This in turn causes a venturi action at the restriction **30** to draw additional light weight material down from the hopper **14** into the low pressure high volume air stream within the venturi restriction. Due to the dissipation of air at the local filling operation, the material flowing into the venturi restriction moves rapidly with the flow of conveying air through the conduit sections **32, 34,** and **62** to the point of dissipation. The net result is that the material from the hopper quickly finds its way to the screen unit being discharged where it rapidly replaces the material passing through the discharge outlet **18**. As a practical matter, there is a slight delay prior to movement of replacement material from the hopper **14** to the point of discharge, at **18**, so that the discharge or filling operation is substantially completed before the replacement material arrives to replenish the contents of the screen section **38**. Therefore, the length and diameter of the screen sections **38** provides a relatively precise degree of control over the amount of material actually delivered through the distribution outlet **18**. This control function is assisted by the particular construction of the interconnecting conduits **60**, which act to prevent overfilling through bypass of material to discharge outlets downstream from the filling operation. The illustrated apparatus thus facilitates rapid, controlled filling or packaging operations at localized positions around the plant, represented by the individual distribution outlets **18**, with immediate makeup of lost material by movement from the hopper **14** to the screen section **38** immediately adjacent the filling operation.

From the foregoing, it will be apparent that the system of apparatus and the method of the present invention makes possible the rapid selective delivery of predetermined volumes of light weight materials at various remote locations, upon demand, and in response to an easily controlled discharge or filling operation. The present invention also enables such results to be easily and rapidly accomplished through use of readily available standard components, which may be easily assembled to meet a wide variety of requirements. The system functions effectively to use the air pressure from a conventional blower to hold and support a source of supply of light weight subdivided materials, while permitting periodic diversion of a substantial portion of such materials to distribution outlets in response to localized demand. The utility of the concepts of the present invention in the rapid selective distribution of light weight materials in subdivided form is thus readily apparent.

It will be further understood that many variations are possible in the method and apparatus described, without departing from the scope of the invention. To illustrate, while conduits and connections of cylindrical cross-section have been illustrated, the invention is clearly not limited to such construction as conduits of rectangular, oblong or like regular cross-section can be used with equal facility. Thus FIG. **9** particularly illustrates a conduit **90** of rectangular cross section. This figure also illustrates the use of a venturi restriction **92** at the point of branching between two adjacent distribution outlets **18**, to effect a reduction in the static pressure at the point of entry to the branch line, represented at **94** in FIG. **9**. As will be apparent, operations to expose the screen section **38** immediately beyond the venturi **92** will cause the air pressure at **94** to reduce to a neutral or negative pressure, thereby effectively preventing light weight materials from being branched off and blown through conduit **96** to the next dispensing outlet.

To those skilled in the art to which this invention pertains, the foregoing and other similar variations are clearly within the scope of the present invention, the disclosure herein being intended as purely illustrative rather than limiting.

I claim:

1. In a system of apparatus for the selective distribution of light weight materials in subdivided form, a hopper containing a substantial quantity of said material, said hopper having a screened gas dissipating outlet, substantially closed conduit means in fluid communication with said hopper outlet, said substantially closed conduit means including a venturi positioned immediately adjacent and in communication with said hopper outlet, means to adjust the cross-sectional area of said venturi, blower means in fluid communication with said conduit means and said gas dissipating hopper outlet, said conduit means being provided with at least one remote distribution outlet, and gas dissipating discharge means at said distribution outlet to effect a controlled discharge of a predetermined volume of said material from said distribution outlet.

2. In a system of apparatus for the selective distribution of light weight materials in subdivided form, a feed hopper containing a substantial quantity of said material, said hopper having an outlet, substantially closed conduit means in fluid communication with said hopper outlet, said conduit means including venturi means in fluid communication with said hopper outlet, gas dissipating screen means positioned in said hopper outlet between said hopper and said venturi means, blower means in fluid communication with said substantially closed conduit means and normally adapted to vent through said screen means in said hopper outlet, said substantially closed conduit means being provided with at least one remote distribution outlet, gas dissipating means at each remote distribution outlet, and discharge valve means cooperating with the gas dissipating means at each said distribution outlet to effect a controlled discharge of material on operation of the valve means.

3. A system of apparatus as in claim **2** wherein said substantially closed conduit means is provided with branch conduit means to effect fluid communication with a series of remote distribution outlets.

4. A system of apparatus as in claim **3** wherein each of said branch conduit means is in fluid communication with said conduit means along an axis which is coextensive with the axis of the conduit means at a point of branching.

5. A system of apparatus as in claim **3** wherein said branch conduit means include venturi means positioned at a point of branching.

6. A system of apparatus as in claim **3** wherein each of said distribution outlets is provided with valve means to separately effect a controlled discharge of a predetermined volume of said material.

7. A system of apparatus for the rigid selective delivery of predetermined volumes of light weight subdivided materials, comprising: a feed hopper adapted to contain a substantial volume of said material, a screened outlet for said hopper adapted to discharge light weight material therefrom by gravity flow, substantially closed conduit means in fluid communication with said hopper, said conduit means including a flattened venturi section immediately adjacent and in fluid communication with said substantially closed hopper outlet, blower means in fluid communication with said screened conduit means and normally adapted to vent through said screened hopper outlet, a series of remote distribution outlets forming a part of said substantially closed conduit means, each of said distribution outlets including branch conduit means terminating in an elongate portion formed of screening means, valve means associated with said branch conduit means and operable to selectively effect a controlled discharge of material from said branch conduit means, each of said valve means being selectively operable to successfully effect discharge and replacement of a predetermined volume of said light weight material.

8. A system of apparatus as in claim 7 wherein the screen area of each of said branch conduit means, within the screened portion thereof, is substantially greater than the screen area of the screened hopper outlet.

9. A system of apparatus as in claim 7 wherein each of said valve means comprises a scissors valve adapted to manual operation with a single hand.

10. In a method for the rapid selective delivery of predetermined volumes of light weight subdivided materials at remote locations, the steps of creating a source of gas under pressure, introducing gas from said source to a generally closed conveyance system, positioning a source of supply of said light weight material adjacent said closed conveyance system, normally directing gas from said pressure source to a zone of gas dissipation between said source of supply of light weight material and said closed conveyance system to thereby effect a holding and supporting of said source of light weight material in suspended relation, and selectively diverting a substantial portion of the flow of gas from said pressurized source to a distribution outlet in said closed conveyance system to both interrupt the flow of gas to said zone of dissipation and to reduce the gas pressure therein, whereby a portion of said supply of light weight material is caused to pass through said closed conveyance system to said distribution outlet.

11. A method as in claim 10 wherein said diversion of the flow of gas from said pressurized source is effected by discharge of substantially all the gas flow through said distribution outlet.

12. A method as in claim 11 wherein the diverting flow of gas to said distribution outlet produces a negative gas pressure at said zone of dissipation.

13. A method as in claim 10 wherein said light weight subdivided material comprises a multitude of individual cushioning and packaging units.

14. A method as in claim 13 wherein said cushioning and packaging units are formed of foamed expanded plastic material having a bulk density of about 0.3 to 4.5 pounds per cubic foot.

15. In a system of apparatus for the selective distribution of light weight materials in subdivided form, a hopper containing a substantial quantity of said material, said hopper having a gas dissipating outlet, substantially closed conduit means in fluid communication with said hopper outlet, said substantially closed conduit means including a venturi positioned immediately adjacent and in communication with said hopper outlet, said venturi being flattened to provide an inside dimension substantially equivalent to the inside diameter of said hopper outlet, blower means in fluid communication with said conduit means and said gas dissipating hopper outlet, said conduit means being provided with at least one remote distribution outlet, and gas dissipating discharge means at said distribution outlet to effect a controlled discharge of a predetermined volume of said material from said distribution outlet.

16. In a system of apparatus for the selective distribution of light weight materials in subdivided form, a hopper containing a substantial quantity of said material, said hopper having a gas dissipating outlet, substantially closed conduit means in fluid communication with said conduit means and said gas dissipating hopper outlet, said conduit means being provided with at least one remote distribution outlet, and gas dissipating discharge means at said distribution outlet to effect a controlled discharge of a predetermined volume of said material from said distribution outlet, said last named means being in the form of an elongated conduit formed of screening means and having a volume substantially equivalent to the volume of material to be discharged from said distribution outlet.

* * * * *