# United States Patent

[11] **3,596,688**


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[54] **FILLER HEAD**
**10 Claims, 5 Drawing Figs.**


[52] **U.S. Cl.** ..... **141/287**
[51] **Int. Cl.** ..... **B65b 1/16**
[50] **Field of Search** ..... 141/67, 51, 59, 287, 313, 392, 286; 251/5; 222/571



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**ABSTRACT:** This subject relates to a filler head of a differential pressure-type filler which is particularly adapted for filling containers with a finely divided material. The filler head is particularly adapted for filling containers having an elongated cross section with the filter head including a valve member having a dispensing opening which is also of an elongated cross section, with the elongation thereof corresponding to the elongation of the carton cross section. The cross section of the valve member, including the dispensing opening thereof, providing for a maximum volume and uniform flow for the particular carton for which the filler head is intended. The filler head also includes a lower filter which is of an outer peripheral outline to correspond to the container to be filled and an inner peripheral outline corresponding generally with the dispensing opening of the valve member.

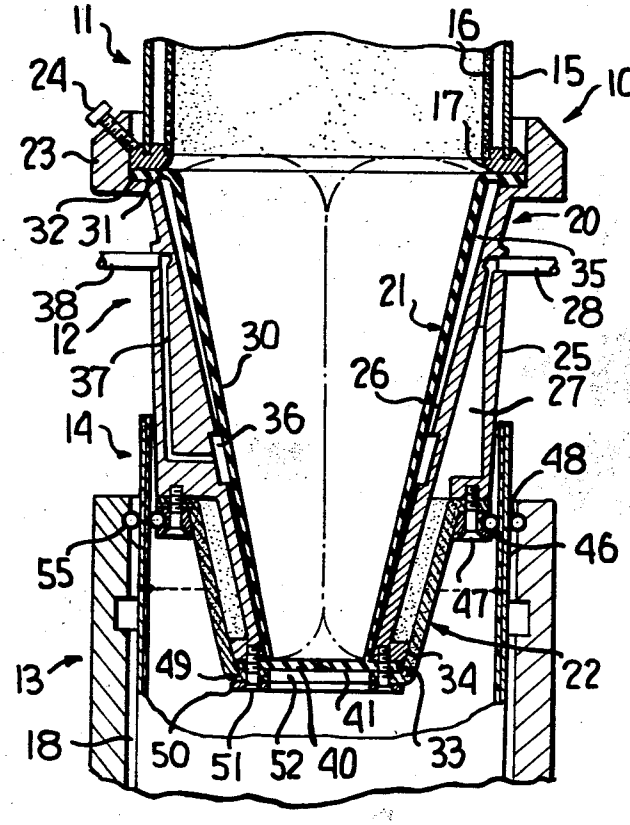



FIG.1

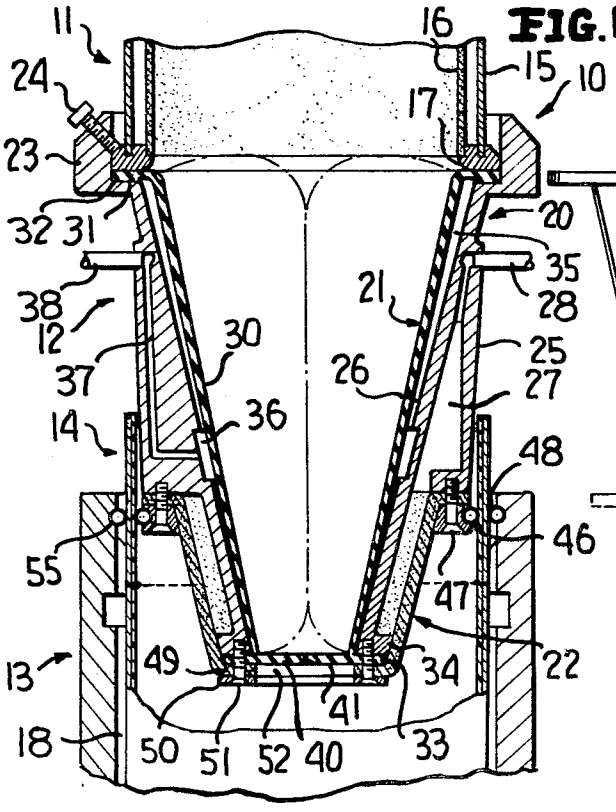



FIG.2

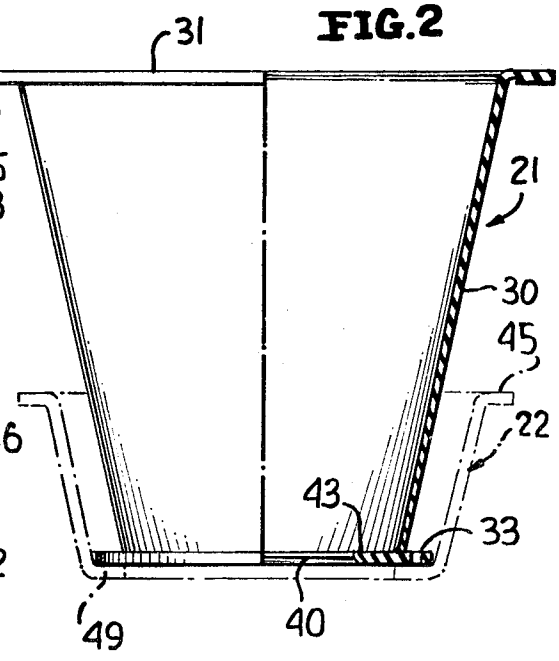



FIG.3

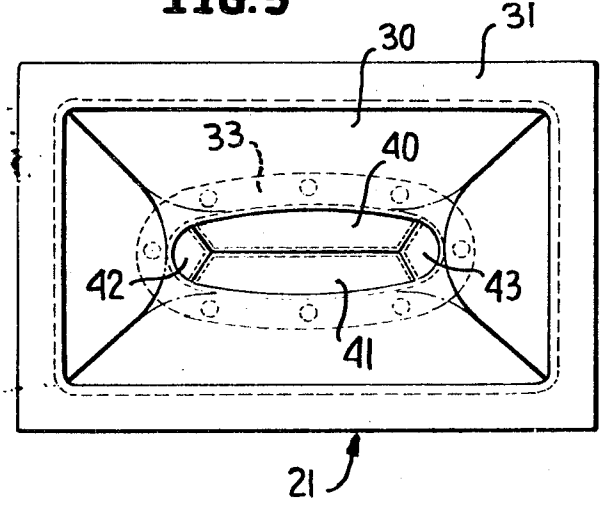



FIG.4

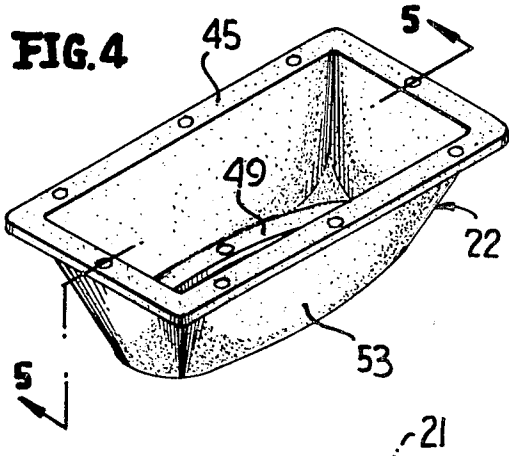
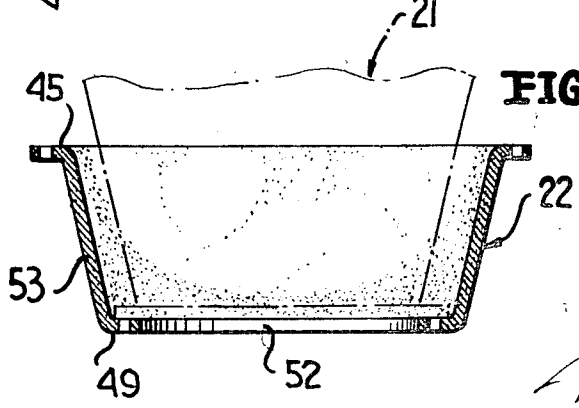



FIG.5

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# FILLER HEAD

This application is a continuation-in-part of my copending application, Ser. No. 748,087, entitled Apparatus and Method For Filling Flexible Containers, filed July 26,1968.

This invention relates in general to new and useful improvements in differential pressure-type fillers, and more particularly to a filler head for a differential pressure-type filler wherein the filler head is particularly adapted for filling containers of an elongated cross section, such as a rectangular or oval cross section.

A primary feature of this invention is to provide a novel valve member for a filler head of a pressure differential-type filler wherein the valve member has a dispensing opening of an outline corresponding generally to the cross section of a container to be filled whereby a maximum volume flow is obtainable with the valve member while providing for uniform material flow.

Another object of this invention is to provide a novel valve member for a filler head wherein the valve member has a dispensing opening which is of an elongated outline and wherein the dispensing opening is normally closed by flap valve elements, the flap valve elements including opposed primary flap valve elements and opposed secondary flap valve elements, the respective areas of the flap valve elements to their hinge lines being such so as to provide for an efficient automatic valving action.

Another object of this invention is to provide a valve member as set forth above wherein the primary flap valve elements are generally trapezoidal in outline and the secondary flap valve elements are generally triangular in outline and wherein the flap valve elements are connected to the valve member along curved lines so as to increase their resistance to deformation from a plane normal to the flow axis of the valve member.

A further object of this invention is to provide a novel filter for use as part of a filler head for a pressure differential-type filler, the filter having an outer peripheral outline generally corresponding to the container to be filled, and having an opening therethrough of an outline generally corresponding to the dispensing opening of an associated valve member with the filter sloping between the inner and outer peripheries thereof so as to provide a maximum effective filter area.

A further object of this invention is to provide a novel filter head which is particularly adapted for filling containers or cartons of a rectangular cross section and wherein the valve member and filter of the filler head are so configurated to provide a maximum volume flow while at the same time providing for a maximum gas removal from the container being filled.

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 drawing:

## IN THE DRAWING

FIG. 1 is a fragmentary vertical sectional view taken through a differential pressure filler incorporating a filler head formed in accordance with this invention and shows the same in position to fill a carton.

FIG. 2 is a side elevational view of the valve member of the filler head of FIG. 1 with a portion thereof broken away and shown in section, there also being illustrated in phantom lines the associated filter.

FIG. 3 is a top plan view of the valve member of FIG. 2 and shows further the details thereof.

FIG. 4 is a top perspective view of the filter.

FIG. 5 is a vertical sectional view taken along the line 5–5 of FIG. 4 through the filter and shows further the details thereof and the relationship thereof to the valve member, the valve member being shown in phantom lines.

Referring now to the drawings in detail, it will be seen that there is illustrated in FIG. 1 primary components of a pressure-differential filler formed in accordance with this invention, the filler being generally identified by the numeral 10. Basically the filler 10 includes an upper magazine 11, a filler head 12 and a lower shroud 13, the shroud 13 receiving a container or carton 14 to be filled.



The magazine 11 is of a double wall construction and includes an airtight outer casing 15 and an inner porous liner 16 through which air and other gases may pass to the exclusion of a finely divided material which is to be disposed within the magazine 11 for dispensing into containers. The casings 15 and 16 are connected together at their lower ends by a suitable supporting ring 17.

In view of the fact that a vacuum is drawn in the operation of the filler 10, and since the container 14 is not self-sustaining, normally it will be desirable to position the container 14 within the shroud. The shroud 13 is constructed so as to provide air spaces 18 surrounding the walls of the container 14. The shroud 13 is provided with suitable means (not shown) for introducing a vacuum into the air spaces 18 wherein the vacuum is sufficiently high to prevent the internal collapsing of the container 14.

Referring now to the filler head 12, it is to be noted that it is formed primarily of a housing 20, a valve member 21 and a filter 22. The housing 20 is of a suitable rigid construction and includes an upper mounting ring 23 in which the lower end of the magazine 11 is telescoped with the filler head 12 being clamped to the magazine 11 by means of suitable setscrews 24 which engage the ring 17.

The housing 20 includes an exterior wall portion 25 which is slightly downwardly tapered so as to facilitate the entrance thereof into the upper portion of the container 14. The housing 20 also includes a downwardly tapering interior wall portion 26 which defines generally a flow passage. It is to be noted that the interior wall portion 26 extends well below the exterior wall portion 25 and therebetween there is defined a passage 27 to which a line 28 is attached. In accordance with this invention, the line 28 is utilized to selectively draw a vacuum in the passage 27, vent the passage 27 to the atmosphere and direct a slight fluid pressure into the passage 27.

The valve member 21 includes an elongated valve body 30 which conforms generally to the outline of the flow passage defined by the interior wall 26 and which tapers in cross section from the upper end thereof to the lower end thereof. The valve body 30 has a wall thickness which gradually decreases from the upper end thereof to the lower end.

The valve 21 is provided at the upper end of the valve body 30 with a thickened mounting flange 31 which is clamped between the ring 17 of the magazine 11 and an upper flange 32 of the housing 20.

The valve member 21 is also provided with a lower mounting flange 33 which is adapted to be clamped against the lower end of the housing 20, the lower end of the housing 20 being in the form of an outwardly projecting flange 34.

Referring now to FIG. 3 in particular, it will be seen that the mounting flange 31 is rectangular in outline whereas the mounting flange 33 is oval in outline. Accordingly, the cross section of the valve body 30 changes from a rectangular cross section at the top to an oval cross section at the bottom.

It is to be noted that the relative configurations of the valve body 30 and the internal wall 26 of the housing 20 is such so as to normally provide a space 35 therebetween. The inner surface of the inner wall 26 is provided with an annular passage 36 in communication with the space 35. The passage 36, in turn, has connected thereto a flow passage 37. The housing 20 has secured thereto a line 38 in communication with the passage 37. The line 38 is utilized to selectively draw a vacuum in the space 35 to outwardly draw the valve body 30 into an open position and to deliver fluid under pressure into the space 35 to inwardly expand the valve body 30 to its closed phantom line position of FIG. 1.

The valve member 31 includes a secondary valve portion in the form of a plurality of flap elements 40,41,42 and 43 which lie in a plane generally coplanar with the bottom mounting

flange 33 and extending transversely of the axis of the valve member 21. The flap valve elements 40 and 41 may be considered to be primary flap valve elements while the flap valve elements 42 and 43 may be considered to be secondary flap valve elements. The flap valve elements 40 and 41 are relatively large and are generally trapezoidal in outline. On the other hand, the flap valve elements 42 and 43 are relatively small and are generally triangular in outline. It is to be noted that each of the flap valve elements is connected to the remainder of the valve member 21 along an arcuate line. As a result, the resistance to bending of the flap valve elements out of general plane is increased.

It is to be understood that when the valve body 30 is moved to its open position, and a vacuum is drawn in the container 14 in a manner to be described hereinafter, the downwardly rushing material being dispensed by the filler 10 will impinge against the flap valve elements and move them downwardly into open positions. Thus, the flap valve elements will automatically open. When the material being placed within the container 14 backs up against the lower end of the filler head and fills all of the space within the container 14 beneath the filler head, the flap valve elements will automatically return to their normal coplanar positions with the result that dribble of the material from within the filler head 12 will be prevented. It is also to be understood that the flap valve elements have a secondary function in that in the event there should be no container in place when the filler 10 is actuated, even though the valve body 30 may be drawn outwardly to its open position and material flows downwardly from the magazine 11, there will be no discharge of the material due to the presence of the flap valve elements. It is further pointed out here that due to the taper of the valve body 30 both in section and in thickness, the valve body 30 moves to its closed position from the bottom end thereof upwardly so as to force the material disposed within the housing 20 back up into the magazine 11. This has the dual advantage of preventing dribble and breaking up any compaction which may occur upon the stoppage of flow of the material after the container is filled. It further provides for an acceleration of the material during the initial phase of filling so as to assure a rapid filling process.

It is to be noted that the filter 22 is of a generally cup shape and includes an upper mounting flange 45 which is rectangular in outline and which preferably corresponds to the cross section of the container 14. The filter 22 is releaseably secured to the lower end of the exterior body portion 25 of the housing 20 by means of a clamping ring 46 which is secured in place by a plurality of fasteners 47. At this time it is pointed out that the clamping ring 46 also carries a sealing ring 48 which is engageable with the internal surface of the container 14 so as to form a seal between the filler head 20 and the container 14. If desired, the sealing ring 48 may be of the inflatable type.

The filter 22 is also provided at its lower end with a mounting flange 49. The mounting flange 49 is clamped against the mounting flange 33 of the valve member 21, which, in turn, is clamped against the flange 34 of the housing 20. In order to clamp the mounting flange 49 in place, there is provided a lower clamping ring 50 which is secured in place by means of fasteners 51. It is to be noted that the mounting flange 49 is generally oval in outline and defines an opening 52 which corresponds generally to the dispensing opening of the valve member 21, which dispensing opening is defined when the flap valve elements 40, 41, 42, and 43 are in their open position. It is further to be noted that the opening 52, which is, of course, aligned with the dispensing opening, provides sufficient clearance for the downward bending of the flap valve elements.

At this time it is to be particularly noted that the filter 22 has a body portion 53 which has a major vertical components. The filter body 53 changes in section from rectangular to oval between the mounting flanges 45 and 49 and due to the major vertical component thereof, a very large filter area is available.

## OPERATION

In the use of the filler head 12, a container, such as the carton 14, is placed within the shroud 13 and a seal is formed between the shroud 13 and the exterior of the carton by means of a sealing ring 55 carried by the upper internal portion of the shroud 13. Then there is relative vertical movement between the shroud 13 and the filler 10 with the result that the lower portion of the filler head 12 is telescoped within the container and a seal formed with the internal surface of the container by the filler head by means of the sealing ring 48. Vacuum is then applied in the space 18 between the container 14 and the shroud 13 so as to support the walls of the container during the filling thereof. Thereafter, a vacuum is drawn in the lines 28 and 38 to simultaneously open the valve member 21 and vacuumize the interior of the container 14. The material (not shown) disposed within the magazine 11 rapidly rushes down into the container 14 with the entrapped and entrained gases being removed through the filter 22. When the container 14 is billed, flow will automatically stop, after which the drawing of a vacuum through lines 28 and 38 is discontinued and the valve member 21 is moved to its closed position by delivering air under pressure through the line 38.

It is to be understood that the specific configuration of the valve member 21 together with the specific configuration of the filter 22, permits a maximum volume flow and at the same time uniformity of flow into the container 14 when the container is of a configuration other than square or round. Because of the elongated cross section of the container, it is desirable to make the cross section of the valve member also elongated and in the same direction. It will be readily apparent from FIG. 3 that by making the discharge opening, defined by the flap valve elements when they are opened, elongated a maximum size discharge opening is permissible. It will also be apparent that flow of the material particles into the various corners of the container is greatly facilitated.

Although only a preferred embodiment of the valve member and filter have been specifically illustrated and described herein, it is to be understood that minor variations may be made therein without departing from the spirit of this invention.

I claim:

1. A filler head for a differential pressure filler particularly adapted for filling containers of an elongated cross section with a finely divided material, said filler head having a lower portion particularly adapted to form a seal with a container to be filled, said filler head including a housing having a downwardly tapering axial passage therethrough, a valve member seated within said axial passage and anchored at the opposite ends thereof to said housing, said valve member being formed of readily deformable resilient material, and said filler head having means for controlling pressure within said axial passage surrounding said valve member to selectively move said valve member into an open position and a closed deformed position, said valve member having a lower dispensing opening which is elongated in the same general direction as the cross section of the intended container wherein a uniform material flow at a maximum volume is obtainable.

2. The filler head of claim 1 wherein said dispensing opening is oval in outline.

3. The filler head of claim 1 wherein said dispensing opening is normally closed by resilient bendable flap valve elements.

4. The filler head of claim 1 wherein said dispensing opening is oval in outline, and is normally closed by resilient bendable flap valve elements.

5. The filler head of claim 1 wherein said dispensing opening is oval in outline, and is normally closed by resilient bendable flap valve elements, each flap valve element being connected to the remainder of said valve member along an arcuate line to increase the tendency of each flap valve element to remain in a plane normal to a flow axis of said valve member.

6. The filler head of claim 1 wherein said dispensing opening is normally closed by resilient bendable flap valve elements, said flap valve elements including two opposed primary flap valve elements and two opposed secondary flap valve elements.

7. The filler head of claim 1 wherein said dispensing opening is normally closed by resilient bendable flap valve elements, said flap valve elements including two opposed primary flap valve elements and two opposed secondary flap valve elements, said primary flap valve elements being generally trapezoidal in outline and said secondary flap valve elements being generally triangular in outline.

8. The filler head of claim 1 wherein said dispensing opening is normally closed by resilient bendable flap valve elements, and said valve member has an inlet of a rectangular outline.

9. The filler head of claim together with a filter member secured to the lower end of said housing and forming in combination therewith a chamber, said filler head having means for controlling the pressure within said chamber, and said filter having a central opening corresponding generally in outline to and aligned with said dispensing opening and a peripheral outline corresponding generally to the cross section of the intended container.

10. The filler head of claim 9 wherein a peripheral portion of said filter is clamped to said housing by a clamp plate, and said clamp plate carrying said lower portion for forming a seal with a container.