United States Patent

[11] 3,559,700

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[54] **METHOD AND APPARATUS FOR FILLING CONTAINERS WITH MULTIPLE SEPARATE STREAMS OF VISCOUS MATERIAL**
9 Claims, 11 Drawing Figs.

[52] **U.S. Cl.** 141/9, 107/8
[51] **Int. Cl.** **B65b 1/06**
[50] **Field of Search** 107/1.4, 8.05, 8; 141/9; 141/100, 105, 107

[56] **References Cited**
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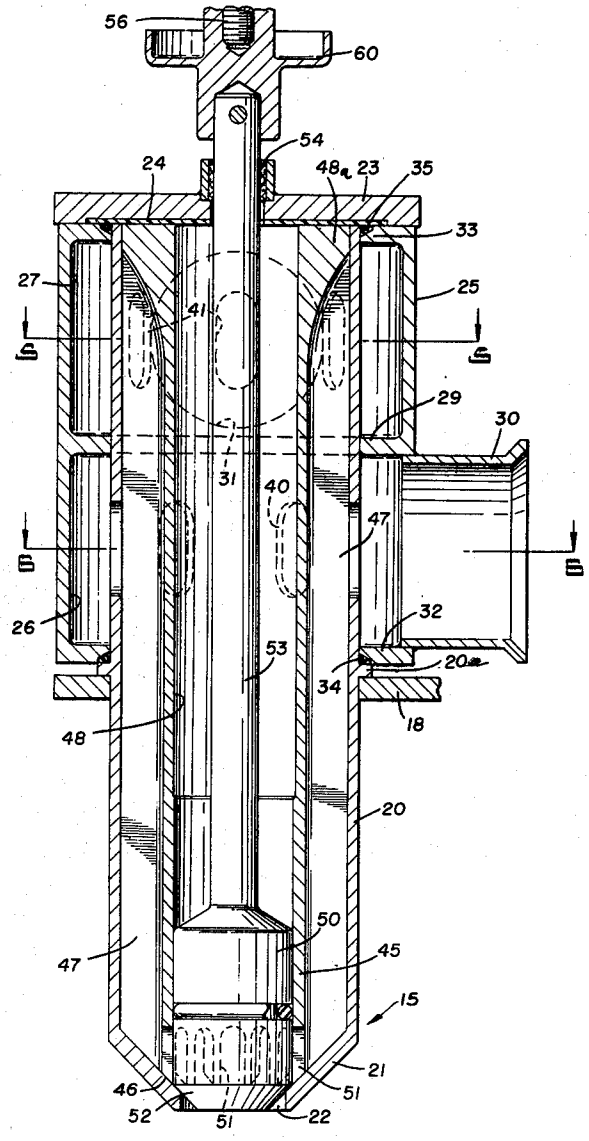
ABSTRACT: Process and apparatus for filling a transparent container with multiple viscous materials, such as edible substances, supplied as separate independent streams and kept independently and completely separate from each other until they enter the container and in which the materials will assume a predetermined pattern. The apparatus includes a nozzle which can be moved vertically or axially relative to the container and an associated valve which can quickly start and cut off the flow of all the separate streams simultaneously.



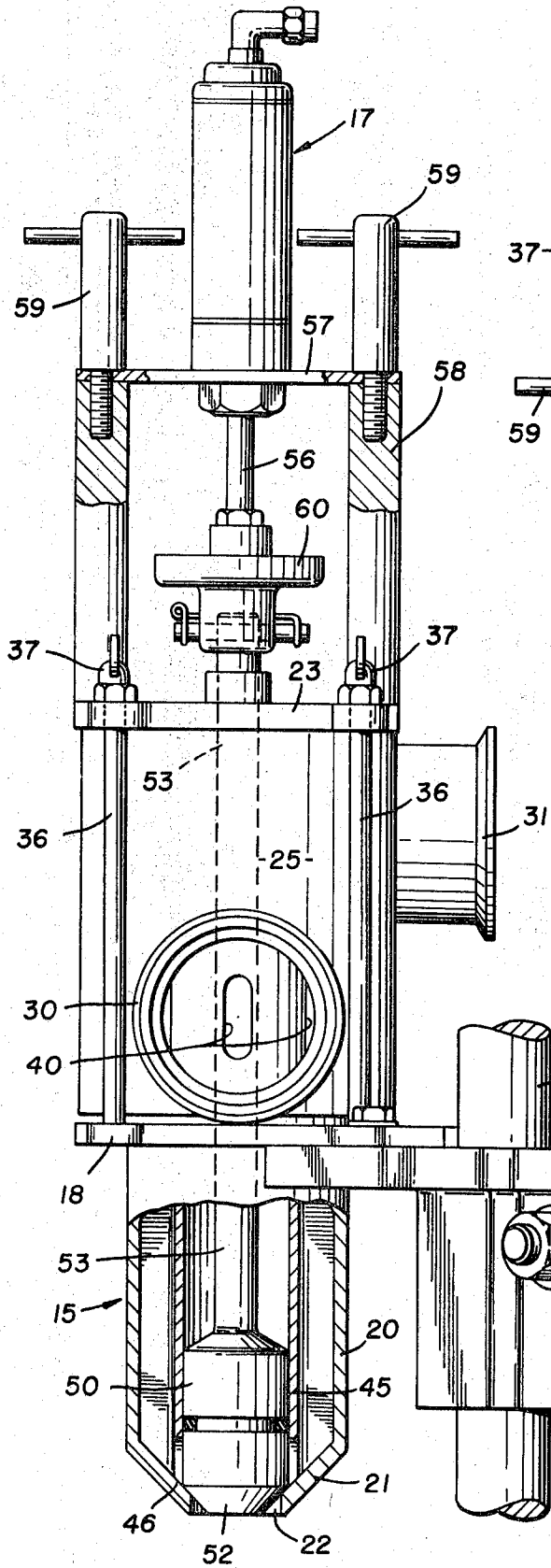


Fig 1

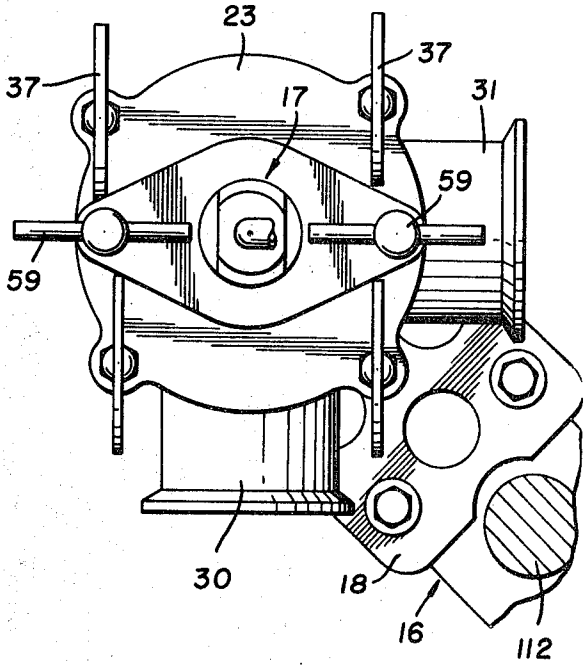


Fig 2

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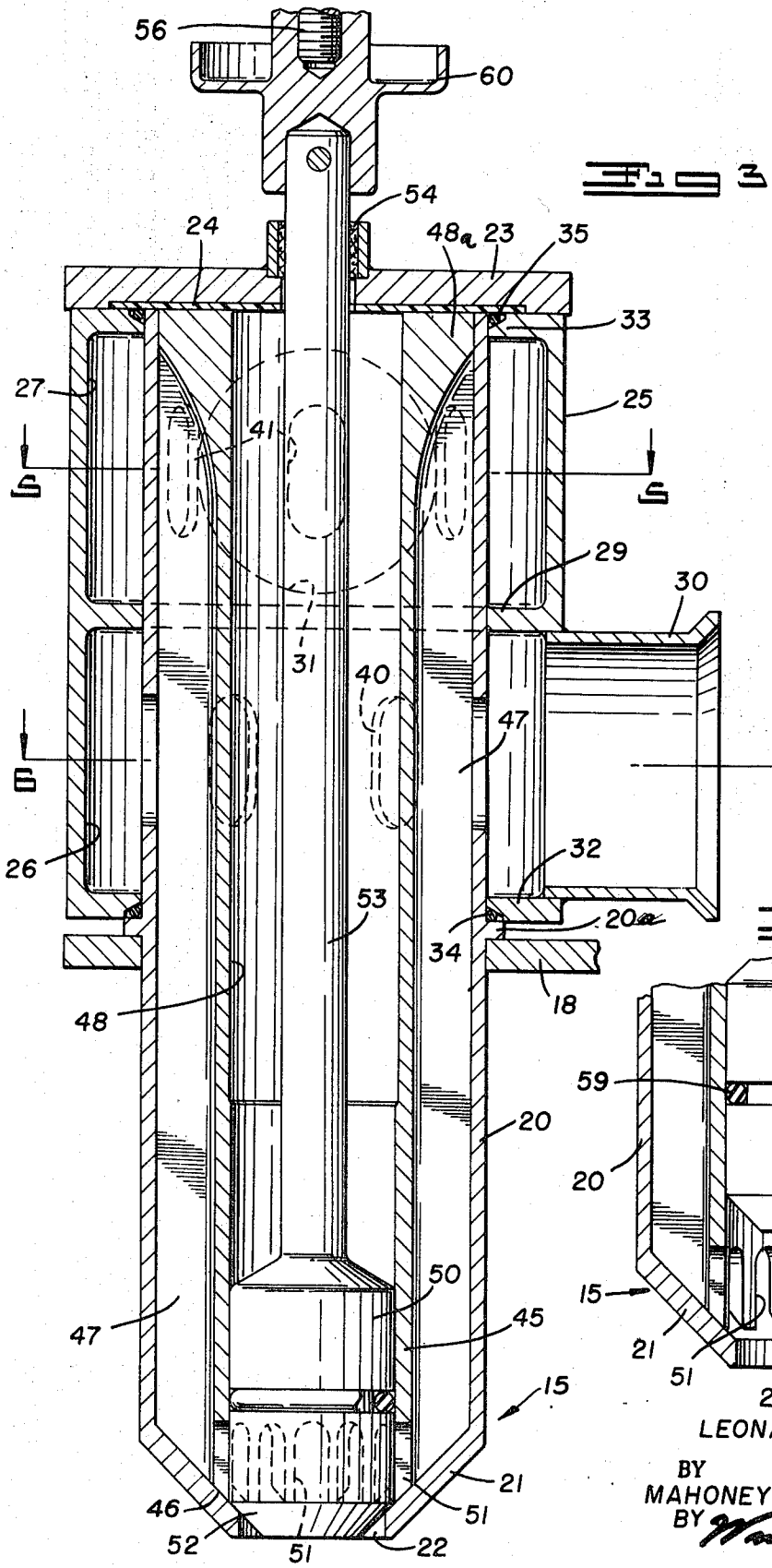

Fig 3

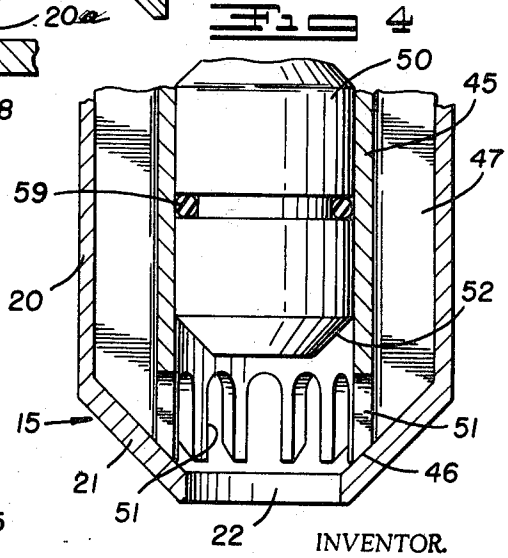

Fig 4

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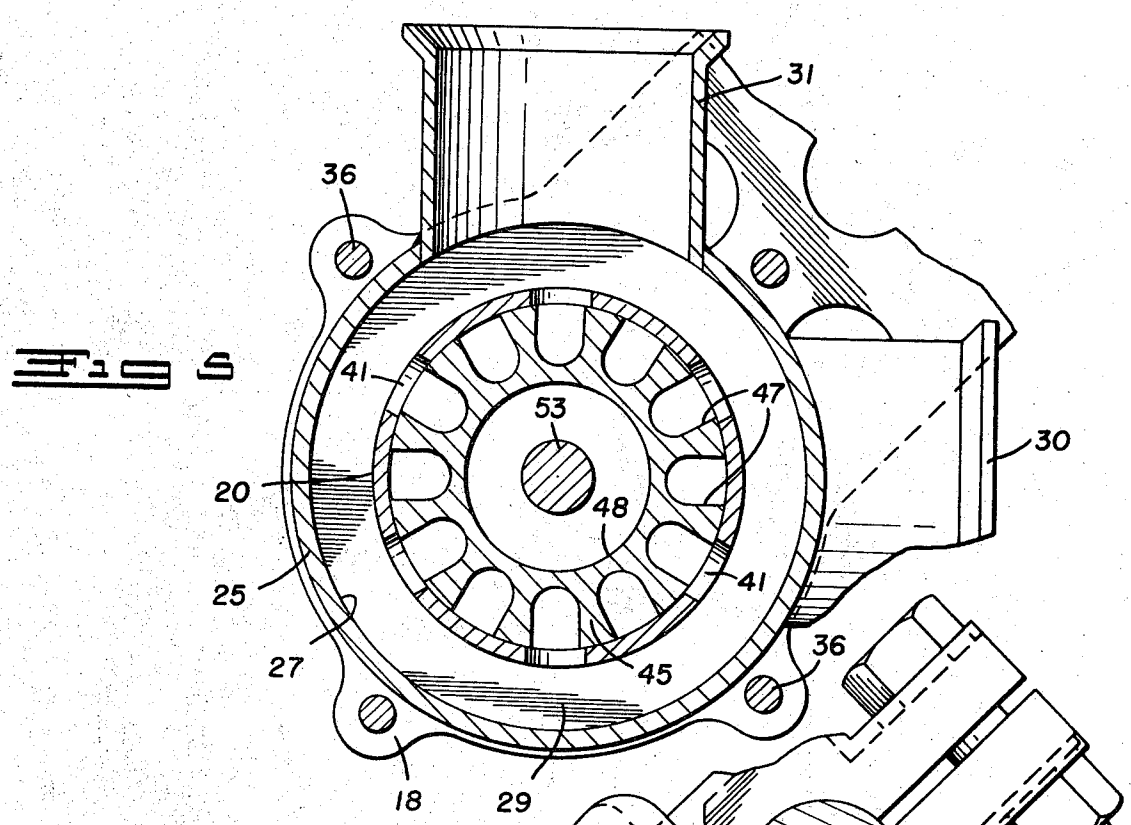
Fig 5



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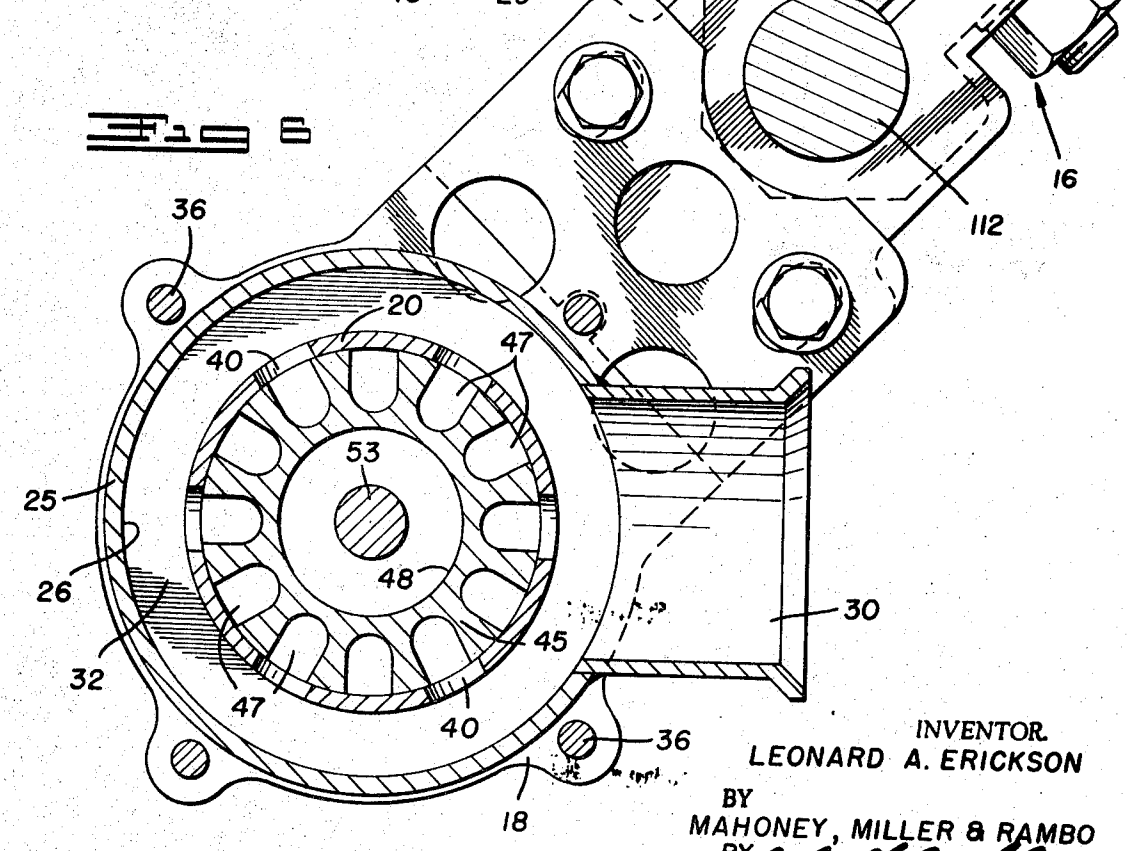

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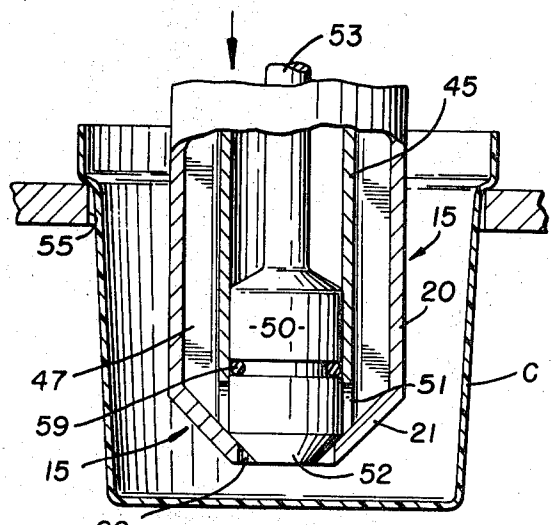

Fig 7

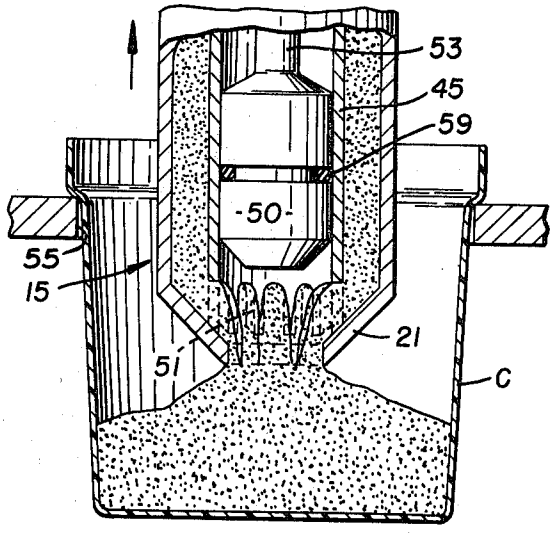

Fig 8

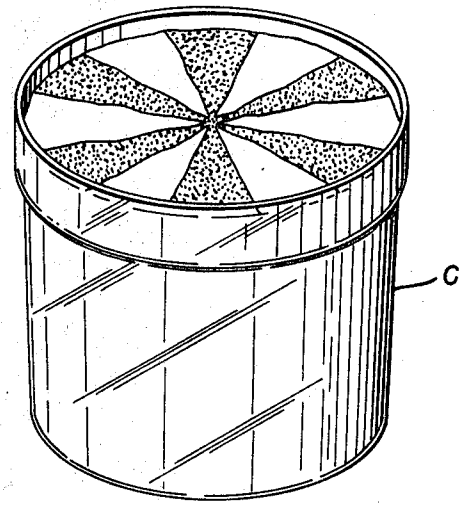

Fig 10

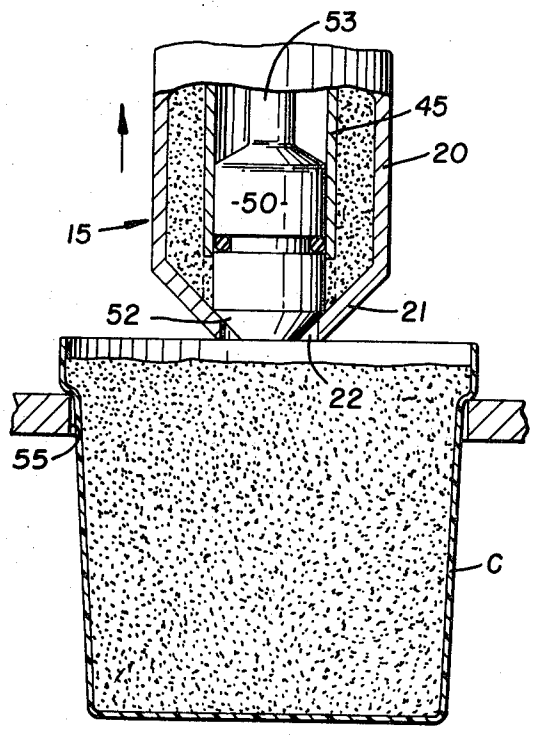

Fig 9

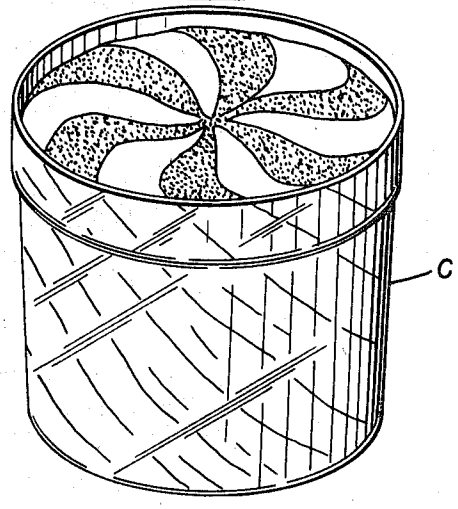

Fig 11

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METHOD AND APPARATUS FOR FILLING CONTAINERS WITH MULTIPLE SEPARATE STREAMS OF VISCOUS MATERIAL

Attempts have been made in the prior art to provide suitable apparatus for the same general purpose but they have not been completely successful because they did not keep the streams of different materials completely separate until they entered the container and did not start and stop all of the streams simultaneously. The apparatus of the present invention overcomes these disadvantages of the prior art in a simple but very effective manner and at relatively low cost. The result of the use of the apparatus is a filled transparent container having the streams of material arranged in a predetermined attractive pattern.

In the accompanying drawings, there is illustrated a preferred form of apparatus in which the present invention is embodied and in these drawings:

FIG. 1 is a side elevational view of a head assembly including the feed nozzle and valve.

FIG. 2 is a plan view of the assembly.

FIG. 3 is an enlarged vertical axial sectional view of the nozzle and valve unit of the assembly, showing the valve closed.

FIG. 4 is a fragmentary sectional view showing the lower end of the nozzle but with the valve opened.

FIG. 5 is an enlarged transverse or horizontal sectional view taken along line 5–5 of FIG. 3.

FIG. 6 is an enlarged horizontal sectional view taken along line 6–6 of FIG. 3.

FIG. 7 is a schematic vertical sectional view showing the nozzle in position near the bottom of the container with the valve opened at the start of the filling process.

FIG. 8 is a similar view but showing the nozzle being raised relative to the container as the filling operation continues.

FIG. 9 is a similar view but showing the nozzle raised to a position at the top of the container with the valve closed at the completion of the filling operation.

FIG. 10 is a schematic view of a transparent cylindrical container filled with vertical wedge-shaped columns of the separate materials.

FIG. 11 is a similar view but showing the materials in the container in the form of helical streams produced by relative rotation of the nozzle and container.

With reference to FIGS. 1 and 2 of the drawings, there is illustrated a head assembly which is of a type that can be mounted on various machines in association with a conveyor which will position the containers C (FIGS. 10 and 11) successively therebeneath, each being axially aligned with the nozzle and valve unit indicated generally at 15. The head assembly may be disposed in cooperation with and over the conveyor of a turret-type or straight line type conveyor where the conveyor moves intermittently to position successive containers below the head which may or may not have means for rotating the conveyor about its axis while positioned in cooperation with the head. For example, the head assembly may be used with a machine of the type disclosed in U.S. Pat. No. 2,934,872 by Wise and be carried by the vertically reciprocable rod 112 thereof. The containers C are preferably transparent, for example being of transparent plastic, so that pattern of material created by the filling operation will be visible. The head may include a clamping bracket, adjacent its lower end and indicated generally at 16, for mounting the head on the vertically reciprocable supporting rod 112 of the machine which may be reciprocated by cam means, as shown in that patent, or by a fluid-actuated unit of a suitable type. The upper end of the head may be provided with a cylinder and piston unit, indicated generally at 17, for actuating the valve of the nozzle and valve unit 15. It will be apparent later that the valve is controlled independently of but in timed relationship to the reciprocation of the entire head by the rod 112.

Attached to the bracket 16 is a lower support plate 18 (FIGS. 1, 2 and 3) which has a central opening downwardly through which is slipped the valve body 20 which is mainly of annular tubular form but is provided with an inwardly tapered

nozzle portion 21 on its lower end having a centrally disposed downwardly opening discharge outlet 22. The valve body is provided at about midway of its height with an annular outwardly projecting circumferential flange 20*a* which normally rests on the upper surface of the plate 18. The upper open end of the nozzle is closed by a removable top plate 23 having a disc gasket 24 positioned in recess in its lower surface.

The upper portion of the valve body 20 above the plate 18 is enclosed within a cylindrical material receiving and supplying housing 25 which is shown divided into two compartments, a lower compartment 26 and an upper compartment 27 separated by a horizontal partition 29. However, the housing may be divided into a more compartments if more than two substances are to be supplied. The lower compartment has an inlet fitting 30 leading radially thereinto and the upper compartment has an inlet fitting 31 leading radially thereinto, and it is preferred that these fittings be angularly as well as vertically spaced. These fittings may be receive the substances to be used in filling the containers from suitable sources and, as previously indicated, these substances may be edible viscous products of different characteristics, for example, two different flavors or colors of ice cream, peanut butter and jelly, etc. The valve body is disposed within an inwardly projecting flange 32 at the bottom of the housing 25, the partition 29 which is a similar flange and the inwardly projecting flange 33 at the top of the housing. A sealing ring 34 is provided at the flange 32 and a sealing ring 35 is provided at the flange 33. The housing 25 is clamped between the lower plate 18 and the upper plate or cover 23 by means of the vertical bolts 36, having wing nuts 37 at their upper ends, it being understood that the nuts and bolts are readily removable to permit separation of parts for cleaning. It will also be apparent that the housing 25 is of lesser cross-sectional area than the plates 18 and 23 so that the bolts 36 will be outside the housing 25. This arrangement also clamps the valve body 20 removably in position by the plate 23 engaging the upper end thereof to hold the flange 20*a* thereof down against the plate 18.

The valve body 20 is provided with a lower set of a plurality of angularly spaced vertical slots 40 which establish communication between the lower compartment 26 and the interior of the valve body. It is also provided with a similar set of angularly spaced slots 41 which establish communication between the upper compartment 27 and the interior of the valve body. The two sets of slots preferably consist of identical numbers of slots. It will be noted that the slots of the respective sets are spaced angularly to be disposed in alternating relationship about the valve body rather than in vertical alignment.

Within the valve body 20 and disposed concentrically therewith is a valve core 45 of tubular form and open at both its upper and lower ends. The upper end is sealed by contact with the basket 24 and the lower edge is tapered at 46 to rest on the inwardly tapering inner surface of the nozzle portion 21. This valve core 45 fits snugly within the body 20 but is removable therefrom when the plates 23 and 18 are separated. The exterior of the valve core is provided with a plurality of vertically extending uniformly angularly spaced outwardly opening grooves or channels 47 which extend substantially the complete length thereof. However, it will be noted that the grooves or channels 47 are closed at their upper ends by an outwardly flared upper section 48*a* cooperating with the valve body 20. The core 45 is provided with a central tubular chamber 48 extending completely therethrough, the lower end of which is adapted to serve as a valve chamber in which a pistonlike valve member 50 is disposed for vertical reciprocation. It will be noted that the tubular core 45 has vertical outlet notches 51 at its lower end, which extend upwardly from the lower extremity of the core, and which are equal in number and spacing to the channels 47 so as to provide inwardly leading outlets therefor, at their extreme lower ends, which lead to the nozzle discharge opening 22. Each of the sets of slots 40 and 41, respectively, communicating with the chambers 26 and 27, is one-half the number of channels 47. The slots 40 and 41 alternate angularly and communicate,

respectively, with alternate channels 47 Thus, the material from the lower chamber 26 is supplied to one-half the channels and the material from the upper chamber 27 is supplied to the other half or alternate channels. The result is that half the streams or columns which issue from the notches 51 will be of one substance and the other half will be of another substance and the columns or streams will alternate. The valve member 50 will serve to cut off all these streams simultaneously just at the outlet 22 and the streams will, therefore, be kept completely separate and independent until just as they pass through the outlet 22 when they can flow into contiguous relationship as they enter the container C. It will be noted that the exterior of the valve member 50 carries a sealing O-ring which contacts with the inner surface of the core 45 but does permit sliding movement vertically of the valve member.

The valve member 50 is provided with tapered valve surface 52 of frustoconical form which will seat on the tapered inner surface of the nozzle portion 21 of the valve body 20, extending partly through the outlet 22, as indicated in FIG. 3. The valve member 50 is carried on the lower end of a valve stem 53 which passes upwardly through the core 45 and is slidably mounted in a sealing gland 54 on the cap plate 23. The upper end of the stem 53 is keyed to a quick-connect coupling 60 which is adapted to be removably connected to the lower end of the piston rod 56 of the cylinder and piston unit 17. This unit 17 is carried by a support plate 57 which is removably secured to the upper ends of posts 58, upstanding from the support plate 23, by means of the easily removable and replaceable clamp bolts 59. Thus, the entire head can be assembled and disassembled readily, it being apparent that in disassembling, the unit 17 is first removed and then the parts of the valve and nozzle unit 15 are disassembled in the manner previously indicated. In assembling, a reverse procedure is followed.

The operation of filling a container by use of this head assembly will be apparent from FIGS. 7—11, inclusive. The container will be supported in axial alignment with the vertically movable nozzle and valve unit 15 being carried in a pocket 55 of the conveyor of the patented machine previously referred to or similar conveyors. The unit 15 is first moved downwardly by downward movement of the vertical supporting rod 112 until the nozzle portion 21 is close to the bottom of the container C as shown in FIG. 7. At this time, the valve 50 is in its lower position with the valve portion 52 seated in the nozzle discharge orifice 22. This will close all the discharge notches 51 so that no material will issue from the nozzle. At this time, the two materials will be completely separate and independent in the alternating channels 47 of the valve core 45. The rod 112 is now raised to move the nozzle portion 21 upwardly as shown in FIG. 8 and simultaneously the valve member 50 is raised to unseat it and allow the separate streams to pass through the outlet notches 51, as indicated in FIG. 8. The viscous streams of the two materials or substances will now flow downwardly into the container and, as the nozzle portion 21 moves upwardly, the container will be gradually filled with separate columns of the two materials. These columns will be pie-shaped or wedge-shaped in transverse section as indicated in FIG. 10 due to the fact that the container is circular. The separate streams or columns of the viscous material will flow together into contiguous relationship but will not mix with each other due to the viscous nature of the materials which will be kept at a predetermined temperature so that they will have a predetermined viscosity to preclude intermingling. The raisin of the nozzle portion 21 will be continued until a predetermined point above the container is reached, as shown in FIG. 9, and just prior to this time, the valve member 50 will be moved downwardly into seating engagement with the nozzle portion 21. This will quickly cut off the flow of materials at the nozzle orifice 22 and will not permit intermingling of the separate streams but they will thereafter be maintained completely separate until the valve is again opened. Thus, the streams of material are kept completely separate and independent until they flow into the container, at which time they will engage each other. If the container in the pocket 55 is rotated by an well-known prior art means as the separate streams of material are fed downwardly thereinto, the result indicated in FIG. 11 will occur. In this case, the two separate streams will also follow helical paths so that the attractive pattern indicated in FIG. 11 will result.

It will be apparent that the above described apparatus provides for the receiving of the two or more separate substances, the feeding of these substances in separate streams to a point of discharge and the control of the discharge by valve means which allows the streams to flow separately into the container and which, when the feeding operation is completed, will quickly cut off the flow of the separate streams at the same point in their advancement towards discharge. The structure by means of which these operations are accomplished is relatively simple and inexpensive and is of such a nature that it can be readily assembled and disassembled for cleaning and sterilizing.

I claim:

1. Apparatus for filling a container with viscous substances of different characteristics comprising a nozzle having a discharge orifice, said nozzle having separate and independent channels leading to said discharge orifice, each of said channels having an independent outlet at said orifice, means for independently supplying different channels with the different substances, and valve means located at said discharge orifice for opening or closing all of said outlets simultaneously and thereby controlling the flow from all of said channels simultaneously so that when the outlets are opened, separate and independent streams of the substances pass from the respective outlets through said discharge orifice and when closed all of said streams are stopped at said outlets.

2. Apparatus according to claim 1 in which the said channels are divided into sets of alternating channels, each of said sets communicating with a different supply chamber connected to a source of supply of one of said substances.

3. Apparatus according to claim 2 in which said nozzle comprises an outer vertical valve body of tubular form having a tapered nozzle portion at its lower end with the discharge outlet centrally thereof and opening downwardly, said valve means including a valve core of tubular form fitted concentrically within said body and having said channels formed in the exterior thereof with their upper ends closed and with outlets at their lower ends leading inwardly to said discharge orifice, separate supply chambers surrounding said valve body and provided with separate outlets leading respectively to the different sets of said channels, said valve means also including a vertically reciprocable valve member disposed in said core and adapted to be seated and unseated relative to said discharge outlet and to cover and uncover said outlets of said channels.

4. Apparatus according to claim 3 wherein the separate supply chambers are at different levels of said valve body and communicate with the interior thereof through said outlets in the form of vertical slots angularly spaced but with the slots at the different levels being out of vertical alignment, said slots of different sets being so disposed angularly that they align with different sets, respectively, of said channels.

5. Apparatus according to claim 4 in which said valve means also includes a piston mounted for vertical reciprocation in said core to cover and uncover the channel outlets at the lower edge thereof which are in the form of notches extending vertically from said edge, said piston having a frustoconical lower end valve portion adapted to seat in said nozzle discharge orifice at the same time the valve covers said notches.

6. Apparatus according to claim 5 including a fluid-actuated unit for vertically reciprocating said valve member in said core.

7. The method of filling a container with viscous substances of different characteristics which comprises forming and feeding separate independent streams of the substances toward a point of discharge into the container and keeping the streams

completely separate and independent until they reach a common point of discharge, in their advance toward the container, and controlling the flow of said separate streams into the container by stopping or starting the flow of all of said streams simultaneously at the said common discharge point.

8. The method of claim 7 in which the container filled is an upwardly opening container of annular cross section and is of transparent material and the separate streams are formed as separate wedge-shaped streams and supplied downwardly into

the container so that the streams entering into the container will produce a visible pattern of separate wedge-shaped columns of the substances.

9. The method of claim 8 in which relative rotation of the container and the streams entering thereinto is produced to cause said columns to be twisted into a helical arrangement in the container.