Sept. 18, 1962 T. J. BENICHASA ETAL 3,054,170

DEVICE FOR AUTOMATICALLY ORIENTING, DELIVERING AND INSERTING COMBINED VALVE AND DIP TUBE IN AEROSOL CONTAINERS

Filed March 14, 1960 3 Sheets-Sheet 1

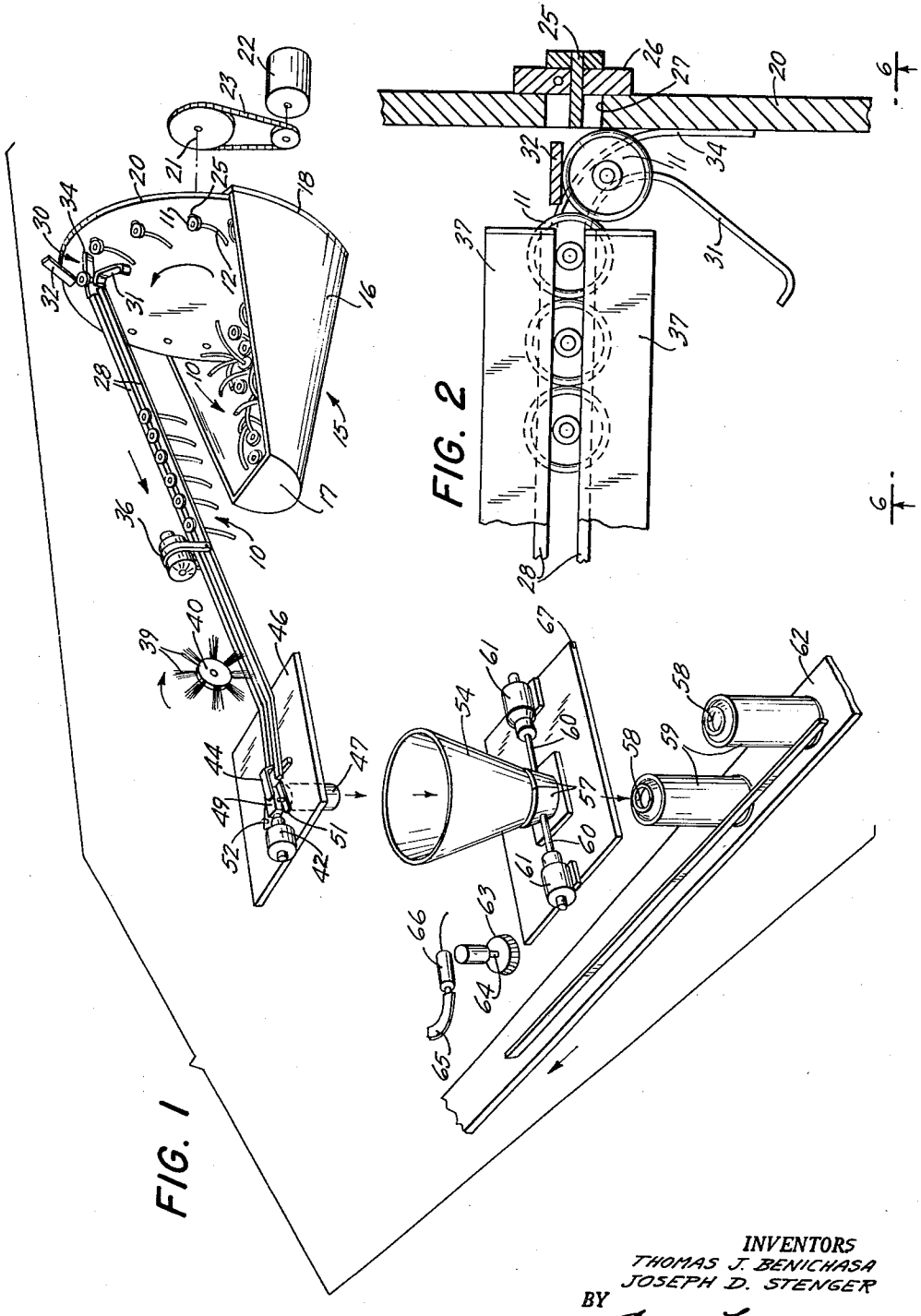


FIG. 1

FIG. 2

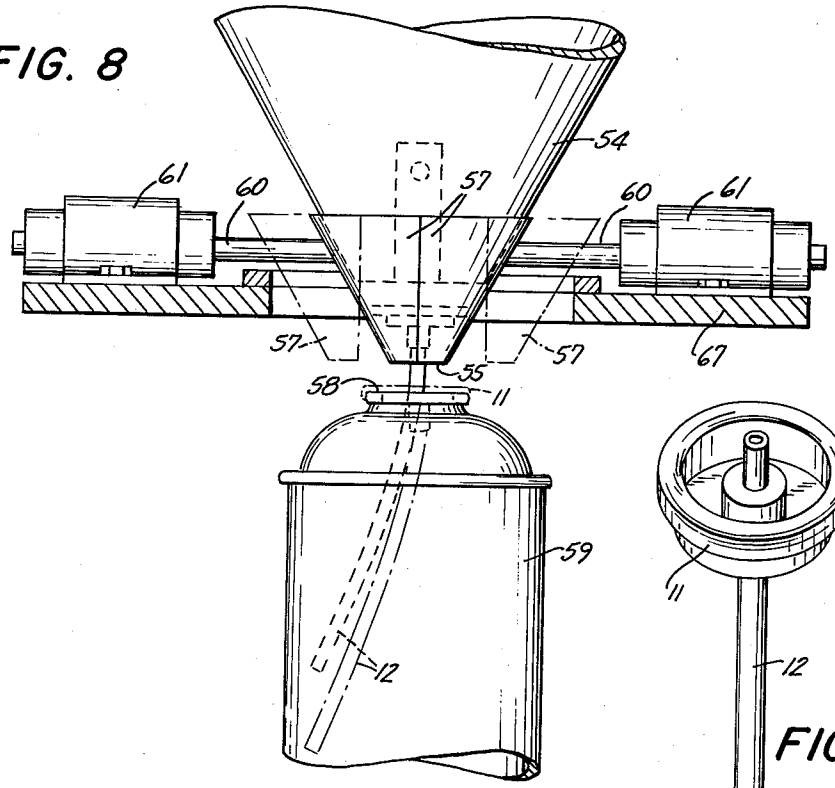
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FIG. 8



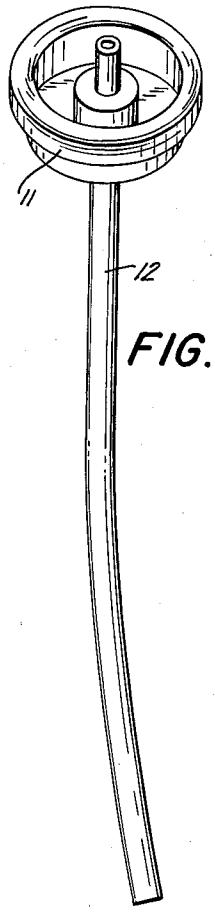


FIG. 5

FIG. 3

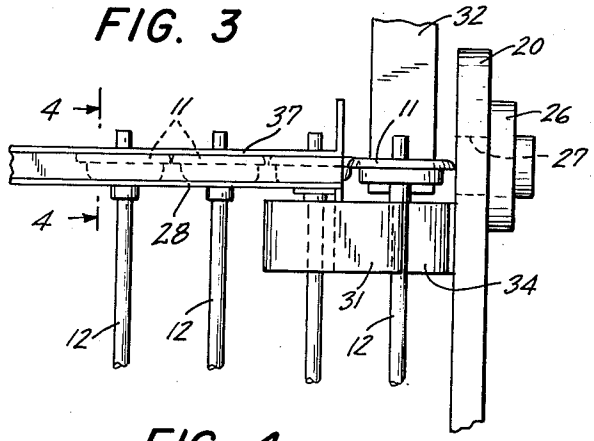
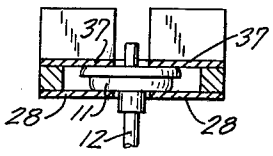


FIG. 4



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Filed March 14, 1960 3 Sheets-Sheet 3

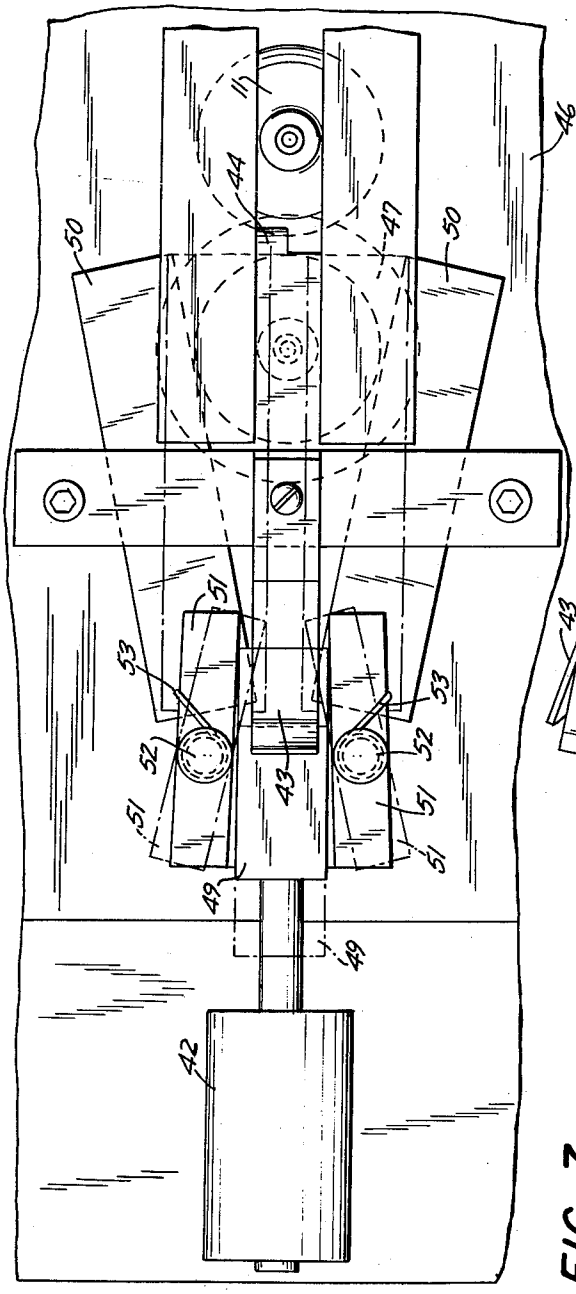


FIG. 6

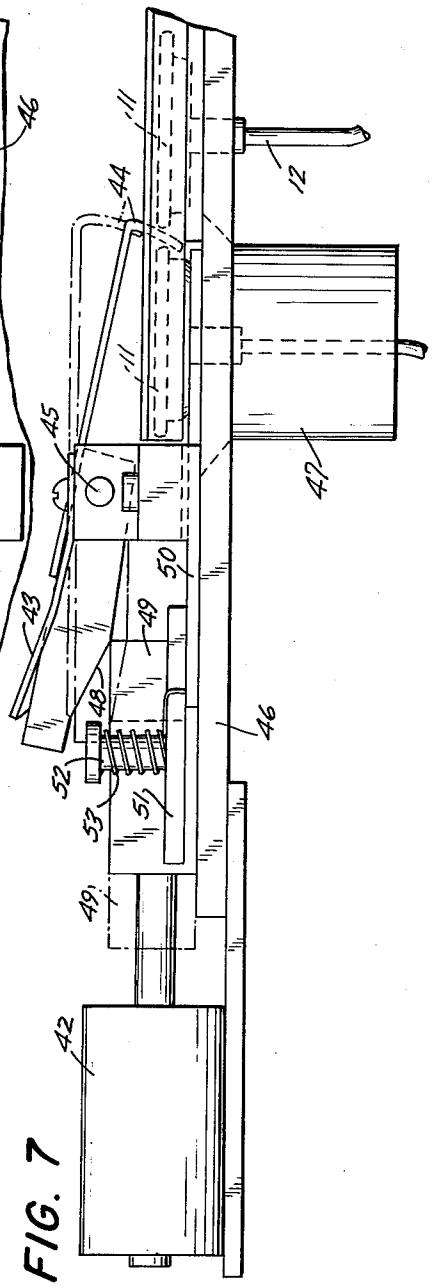


FIG. 7

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DEVICE FOR AUTOMATICALLY ORIENTING, DELIVERING AND INSERTING COMBINED VALVE AND DIP TUBE IN AEROSOL CONTAINERS

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7 Claims. (Cl. 29—208)

This invention relates to material handling apparatus and, more particularly, to apparatus for inserting valve assemblies into containers during the manufacture of pressurized cannisters.

Ordinarily, it is necessary to manually insert the valve stems and closures of manually operated valve assemblies to the open neck of cannisters to be pressurized during the filling thereof. It is, therefore, an object of the present invention to provide a completely automatic device for orientating, feeding, and inserting individual ones of such valve assemblies into individual cannisters in a simple, rapid, and efficient manner.

Another object of the present invention is to provide a device for orientating random stored valve assemblies received from a hopper, into aligned identical positions for individual feeding to a guide mechanism which assures the proper insertion of the invidual valve assembly into each cannister unit forming a part of the finished product.

Still another object of the present invention is to provide a guide mechanism for directing elongated valve assemblies into the interior of a relatively small opening in the top of a container in a substantially foolproof and highly effective manner.

An additional object of the present invention is to provide a complete apparatus for orientating, guiding, and inserting random stored valve assemblies into proper position within a small opening of the container for high speed production methods.

All of the foregoing and still further objects and advantages of this invention will become apparent from a study of the following specification, taken in connection with the accompanying drawing, wherein:

FIG. 1 is a diagrammatic perspective view of valve assembly orientating feeding, and guiding apparatus made in accordance with the present invention.

FIG. 2 is an enlarged fragmentary cross-sectional view of certain parts of the assembly shown in FIG. 1.

FIG. 3 is a fragmentary side elevational view of FIG. 2.

FIG. 4 is a fragmentary cross-sectional view taken along line 4—4 of FIG. 3.

FIG. 5 is a perspective view of a valve member of the type especially adapted for handling in accordance with the present invention.

FIG. 6 is a plan view of other parts of the present invention.

FIG. 7 is a side view of FIG. 6.

FIG. 8 is a fragmentary cross-sectional view of still other parts of the present invention.

In accordance with the present invention, apparatus is provided which is especially adapted for orientating, feeding, and guiding valve assemblies **10** of the type shown in FIG. 5, into provided openings in the tops of cannisters which are subsequently pressurized so that the contents thereof may be dispensed through such valve assemblies **10**. Each such valve assembly **10** preferably includes a magnetically permeable head **11** and a magnetically impermeable hollow stem **12** which may be a flexible plastic tube through which the contents are carried to the valve structure within the head **11**.

During the manufacturing and assembling of the finished product, a quantity of valve assemblies **10** are stored in bulk within a hopper **15** of generally hollow, semiconical configuration having a longitudinal axis lying within a substantially horizontal plane. This hopper includes a side wall **16**, a closed end wall **17** at the smaller end, and a closed end wall **18** at the base end. A baffle **19** in the hopper directs the valve assemblies toward the base end where elevating means in the form of a disc **20**, is secured upon a shaft **21** for rotation partially within this base end of the hopper **15**. A pulley connected to the shaft **21** supplies driving rotating power to the disc **20** from a motor **22** through a pulley chain **23**. The speed of the motor **22** may be controlled to rotate the disc **20** at a relatively low rate of speed.

Valve grippers, in the form of permanent magnets **25**, mounted in magnetically impermeable bushings **26**, are secured in circumferentially spaced apart relationship adjacent to the periphery of the disc **20**, each such magnet **25** being received within one end of a magnetically impermeable bushing **26** mounted within a bore **27** through the disc **20** and being substantially flush with the surface of the disc **20** facing the valve assemblies **10** carried within the hopper **15**. The opposite end of each bushing **26** projects outwardly from the opposite surface of the disc **20** to serve as an agitating device for continuously agitating the contents within the hopper **15** as the disc is rotated, thus assuring continuous downward flow of valve assemblies from the apex end to the base end of the hopper to constantly supply the valve grippers **25**. As the disc **20** is rotated, the facing ends of the magnets **12** coming into contact with the magnetically permeable heads **11** of adjacent valve assemblies **10** to lift single ones of such valve assemblies above the level of the mass of valve assemblies within the hopper **15**.

As each of the valve assemblies **10** reaches the uppermost level of the disc **20** during the rotation thereof, a wiping trough **30** releases each valve assembly from its associated valve gripper magnet **25**, for downward movement by gravity onto a pair of feed rails **28** that are in spaced apart parallel relationship to define a chute leading to an associated part of the equipment. The wiping trough **30** is generally of V-shaped configuration having one side **31** spaced from the disc to allow the head **11** of each valve assembly to pass into the center of the trough. The opposite side **34** of the wiping trough extends into close proximity with the facing side of the disc **20**, with a knock-off bar **32** provided for dislodging each valve assembly from its gripping magnet **25** as the disc **20** continues to rotate. This insures that the stem **12** of the valve assembly will drop into the space between the rails **28** of the chute as the valve assembly drops from the higher level of the disc, downwardly, toward the hopper **15** disposed therebeneath. A vibrator **36** may be connected to the rails **28** to move all of the valve assemblies so accumulated downwardly along the length thereof toward the lower level of its discharge end. Overlying plates **37** prevent climbing or stacking of the valve assemblies during such movement.

A slowly rotating flexible brush feed wheel **40**, mounted upon a drive shaft of a motor, overlies the discharge end of the chute so that all valve assemblies **10** moving therealong will be engaged by the brushes and positively directed downwardly toward the discharge end thereof.

Reference is now made to FIGS. 6 and 7. A stop finger **44**, pivotally supported upon a bearing **45** of the plate **46** of a slotted tube guide **47** has one end normally lying in the path of movement of the lowermost one of the valve assemblies **10**, against a leaf spring **43**, and has an inclined cam surface **48** at the opposite end confronting the plunger head **49** of a solenoid or air piston **42**. A pair of rail extensions **50** are secured to links **51** pivotally mounted

on pivot pins 52 of the plate 46, and normally prevent downward movement of the lowermost valve assembly carried thereby.

Torsion springs 53 encircling each pin 52 yieldably urge the link supported rail extensions 50 toward the dotted line parallel position shown in FIG. 3, thus supporting the lowermost valve assembly directly above the tube guide 47. However, the sides of the plunger head 49 in the normally extended position of the plunger, act upon the links 51 to spread the rail extensions 50 apart, to allow the lowermost valve assembly to drop into the tube guide 47. Thus, each time the plunger head is retracted, the rail extensions 50 close to the parallel position to support the next valve assembly released by the simultaneous upward movement of the release finger 44 by its spring 43. Upon return of the plunger head to the extended position, the aforementioned cycle is repeated for each operation.

The tube guide 47 empties directly into a tapered guide funnel 54. With reference now more specifically to FIG. 8 of the drawing, it will be noted that the lower discharge end of the tapered funnel guide 54 is large enough to allow the passage of the entire valve assembly 10 downwardly therethrough. The size of this opening, therefore, is thus necessarily substantially larger than the opening 58 into which the relatively small stem 12 is inserted into the can 59. In order to ensure the free movement of the free end of the stem 12 into the opening 58 of the can 59, a pair of funnel halves 57, which form a guide extension of the tapered funnel guide 54, is supported adjacent to the lower discharge end of the funnel guide. A pair of plungers 60, each actuated by a separate air cylinder or solenoid 61 carried upon a platform 67, supports the funnel halves 57 for movement in opposite axial directions normal to the longitudinal axis of the tapered funnel guide 54 between the normally constricting position relative to the discharge end of the tapered funnel guide 54 and an adjusted open position. In the normally constricting position, the smaller lower end of the closed guide extension formed by the funnel halves is no larger in diameter than the opening 58 of the container 59 which it overlies and into which the free end of the valve assembly stem 12 is inserted, thus assuring that the free end of the stem will automatically drop into the opening 58 when it is released from the forked member 46 in the manner hereinbefore described. Immediately after the stem 12 has been inserted into the opening 58 of the can 59, the actuating members 61 of the funnel halves 57 retract such funnel halves toward their open position, allowing the head 11 of the valve assembly to drop clear of the lower discharge end of the guide extension before the funnel halves 57 are returned to their constricting position.

With the valve assembly 10 thus properly positioned within the opening 58, the can 59 may be moved along its conveyor 62 toward the next station which includes crimping mechanism for securing the head 11 of the valve assembly to the opening defining flange of the can 59, and which crimping operation forms no part of the present invention. Along the path of movement toward the crimping station, a centering cone 63 operated by a plunger 64, may be used to properly seat the head 11 of the valve assembly upon the top of the can 59, following which the presence of the can 59 of the crimping station may be detected by the feeler arm 65 of a normally open microswitch 66, to initiate the crimping operation. If no valve is present, the microswitch will not be actuated.

It will now be recognized that completely automatic apparatus has been provided for orientating random stored valve assemblies, feeding such orientating valve assemblies toward a work station, metering individual ones of such orientated valve assemblies fed to the work station into a guide mechanism for insuring the proper insertion of the valve assembly into the open top of a container, and for completely releasing the valve assembly and can for movement to a subsequent work station. The various actuating pistons or solenoids 42, 49, 61 may be controlled in any desired manner, such as by a cam timer, and the speed of rotation of the elevating disc 20 may be controlled through the motor 22 or any other speed control device.

While this invention has been described with particular reference to the construction shown in the drawing, it is to be understood that such is not to be construed as imparting limitations upon the invention, which is best defined by the claims appended hereto.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. Apparatus for inserting elongated valve assemblies into upwardly opening containers comprising, in combination, a valve assembly storage hopper, a quantity of randomly stored valve assemblies in said hopper, each said valve assembly having a circular magnetically permeable head and a magnetically impermeable flexible tube extending axially from said head elevating means for lifting individual of said valve assemblies to a higher level in a substantially erect position with said tubes extending downwardly, a chute underlying said higher level, wiping means above said higher level for releasing the successive valve assemblies from said elevating means for downward movement by gravity vertically into one inlet end of said chute, said chute slidably supporting said valve assembly for movement along a predetermined path in an erect position toward an opposite discharge end beneath the level of said one inlet end, a funnel-shaped guide beneath said discharge end of said chute and having its smaller end opening downwardly toward the open top of a container presented beneath it, said guide slidably receiving each valve assembly from said discharge end of said chute therethrough, a sectional guide extension adjacent to the lowermost end of said funnel-shaped guide means for moving said extension sections toward and away from each other for selective cyclical movement between a normally constricting position around said one end of said funnel-shaped guide and an adjusted open position, said guide extension in said constricting position being only large enough to allow downward movement at the lowermost portion of each valve assembly therethrough and blocking downward movement of an upper portion thereof, and said guide extension in said open position being large enough to allow downward movement of said upper portion of said valve assembly therethrough.

2. Apparatus for inserting elongated valve assemblies as set forth in claim 1, wherein said elevating means comprises a disc supported for rotation in a vertical plane, and a plurality of circumferentially spaced apart magnetic valve grippers carried by one side of said disc confronting said wiping means, and said hopper receiving a lower portion of said disc for movement through said quantity of random stored valve assemblies therewithin.

3. Apparatus as set forth in claim 2, wherein said magnetic valve grippers comprise magnets having one end substantially flush with one side of said disc for magnetically attracting and engaging the magnetically permeable portion of each of said valve assemblies and for identically orientating said assemblies.

4. Apparatus as set forth in claim 2, wherein said wiping means comprises a trough having one side in close proximity with an uppermost portion of said one side of said disc for blocking continued rotation of valve members past a central point thereof and dislodging such valve assemblies carried by said magnetic valve grippers for movement downwardly by gravity onto said chute.

5. Apparatus as set forth in claim 4, wherein said chute comprises a pair of spaced apart parallel ends slidably supporting the upper portions of said valve assemblies thereupon and defining a space therebetween slidably receiving the lower portions of said valve assemblies therethrough.

6. Apparatus as set forth in claim 4, wherein said guide comprises a funnel, said guide extension comprises

a pair of funnel halves, and actuating means supporting each one of said funnel halves for aligned movement in opposite directions normal to the longitudinal axis of said funnel between said constricting and open positions.

7. Apparatus as set forth in claim 4 further comprising metering means controlling the sequential movement of a single valve assembly to said guide from said chute during each cycle of movement of said guide extension, said metering means comprises a pair of pivotally supported rail extensions normally in a spaced apart released position intermediate said discharge end of said chute and said guide receiving and releasing single valve assemblies received thereupon from said chute, and a pivoted finger member, means for actuating said finger member for normally blocking movement of valve assemblies at said discharge end of said chute and having retracting means momentarily freeing each lowermost valve assembly for movement onto said rail extensions, and actuating means simultaneously rotating said rail extensions into a parallel position supporting the lowermost one of said valve assemblies in response to movement of said finger member out of said blocking position.

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