Jan. 23, 1962 H. E. HUDDLE 3,018,200

METHOD AND APPARATUS FOR CLEANING BOTTLE CASES AND THE LIKE

Filed June 3, 1958 2 Sheets-Sheet 1

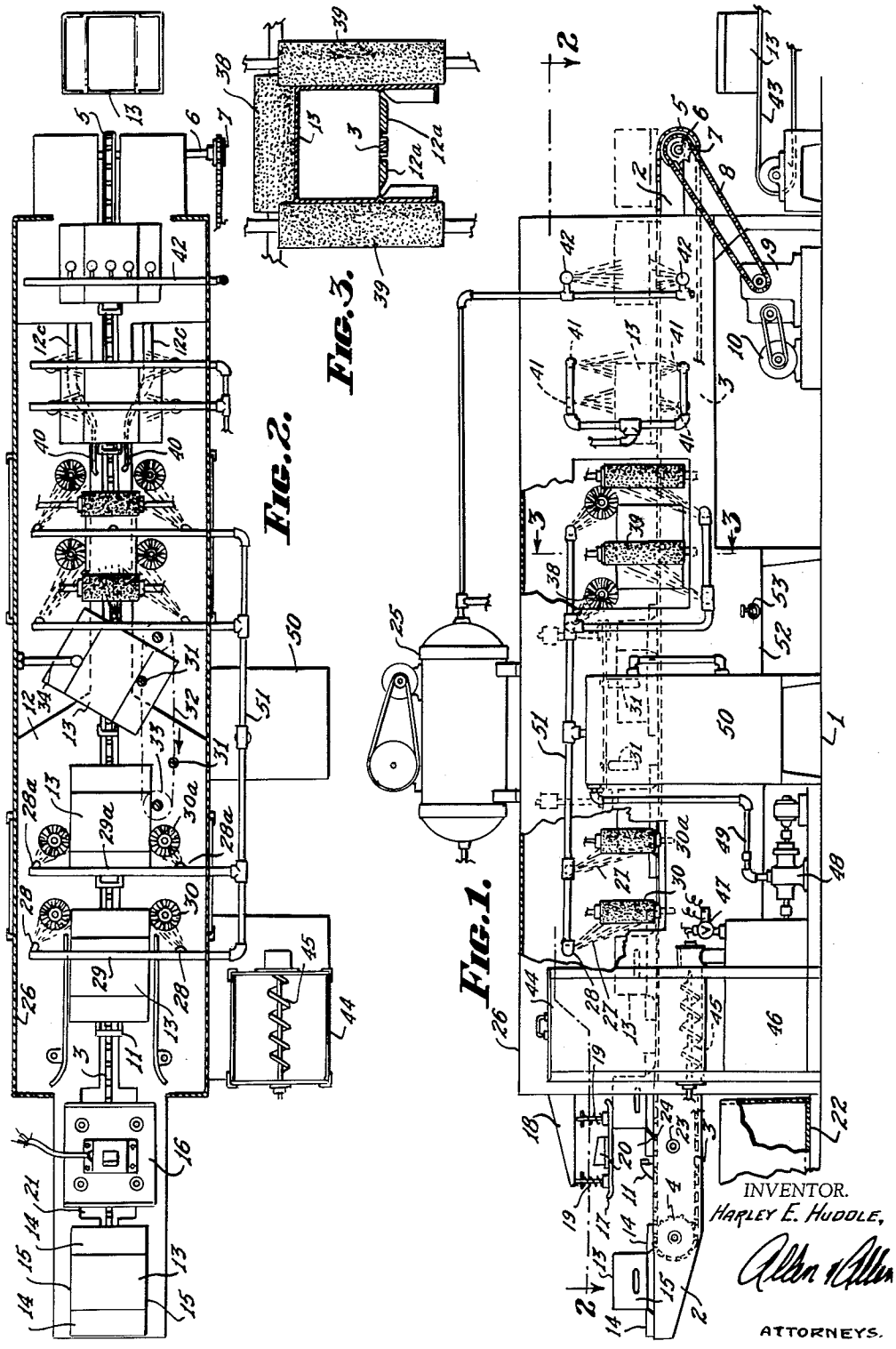

Fig. 3.

Fig. 2.

Fig. 1.

INVENTOR.
HARLEY E. HUDDLE,

Allen & Allen

ATTORNEYS.

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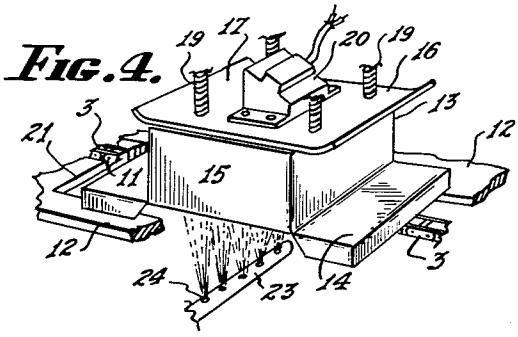
Filed June 3, 1958 2 Sheets-Sheet 2

FIG. 4.



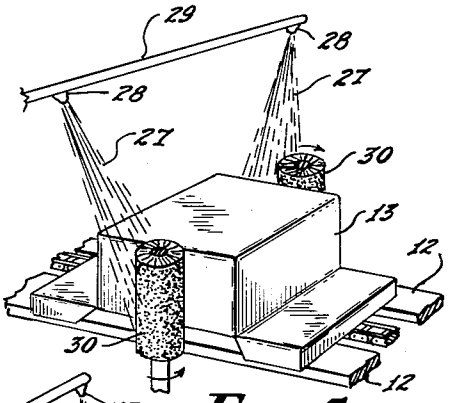


FIG. 5.

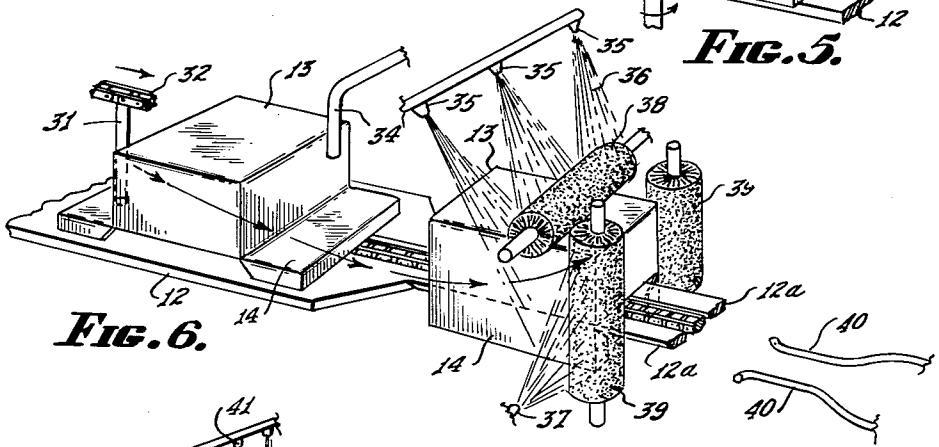


FIG. 6.

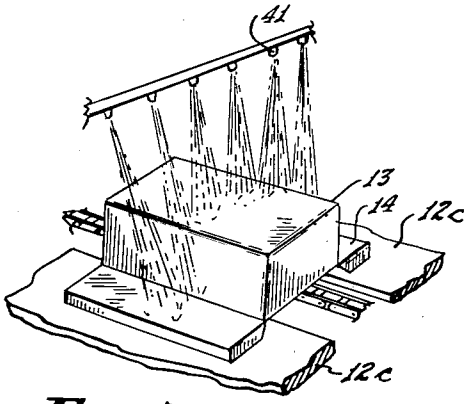


FIG. 7.

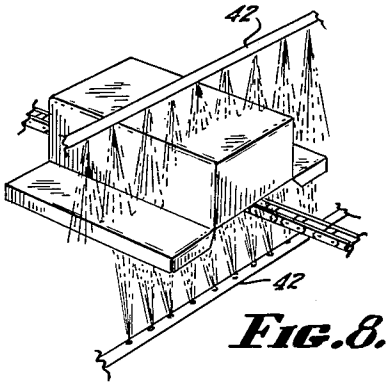


FIG. 8.

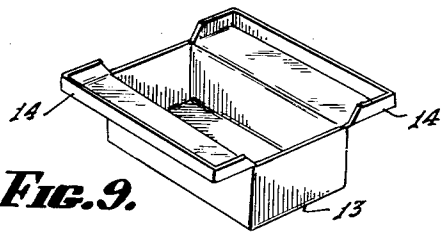


FIG. 9.

INVENTOR.
HARLEY E. HUDDLE,
BY Allen & Allen
ATTORNEYS.

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METHOD AND APPARATUS FOR CLEANING BOTTLE CASES AND THE LIKE

Harley E. Huddle, % Cincinnati Cleaning & Finishing Machine Co., 2000 Hageman St., Cincinnati, Ohio

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5 Claims. (Cl. 134—6)

This invention relates to a cleaning or washing machine or more particularly to a device for cleaning the cases in which beverage bottles or similar containers are packed for consumer sale.

In the bottling industry, and particularly in the brewing industry, the current practice is to pack sales units of 24 bottles in cases formed from fiberboard or similar paperboard material. Such cases are relatively inexpensive as compared to wooden cases and while their useful life is relatively short, they are nevertheless capable of being re-used many times. However, it has been found that after the cases have been used several times, they tend to become soiled and dirty and hence lose their sales appeal as well as their value as an advertising medium. In this connection, it may be observed that the cases are usually printed in multi-colors to display the producers trademark and other indicia which serves to readily identify the product.

In order to alleviate the aforementioned difficulties and to proof the cases against exposure to the elements, many of the case manufacturers now coat the cases with a plastic or resinous surfacing material. While such coatings prolong the life of the cases and render them less subject to being soiled and marred, the cases nevertheless become unacceptably soiled and dirty long before their useful life is at an end.

Accordingly it is a principal object of the instant invention to provide a device by means of which the cases may be easily and quickly cleaned and restored to useable condition.

Another object of the invention is to provide mechanism and procedures by means of which fiberboard cases may be rapidly and continuously cleaned without damaging the fiberboard or other similar material from which the cases are constructed.

Still a further object of the invention is the provision of a completely integrated cleaning device to which used and dirty cases may be fed and from which cases are delivered ready for immediate use, the device acting automatically to remove debris from the interior of the case, scrub clean all exterior surfaces of the case, including the cover flaps, rinse the entire case inside and out, dry it and deliver the finished case ready for use.

Still a further object of the invention is the provision of a novel cleaning procedure wherein the surfaces to be cleaned are sprayed with a soap or detergent foam which is retained in place on the wall surfaces of the case until contacted by the scrubbing brushes. In addition to adhering uniformly to the surfaces of the case, the foam is essentially "dry" and hence does not unduly wet or penetrate into the fiberboard walls of the case.

Still a further object of the invention is the provision of a high speed mechanism capable of rapidly and continuously handling large quantities of cases, thereby assuring an adequate supply of clean cases at all times.

The foregoing, together with other objects of the invention which will appear hereinafter or which will be apparent to the skilled worker in the art upon reading these specifications, I accomplish by that construction and arrangement of parts and those procedures of which I shall now describe an exemplary embodiment:

Reference is now made to the accompanying drawings wherein:

FIGURE 1 is a side elevational view with parts broken away of a cleaning device in accordance with my invention.

FIGURE 2 is a horizontal sectional view taken along the line 2—2 of FIGURE 1.

FIGURE 3 is a vertical sectional view taken along the line 3—3 of FIGURE 1.

FIGURE 4 is a fragmentary perspective view illustrating the position of the cases as they enter the machine, the figure also illustrating the vibrator and compressed air means for removing debris from the interior of the case.

FIGURE 5 is a fragmentary perspective view illustrating the application of foam and the scrubbing of the end walls and end flaps of the case.

FIGURE 6 is a fragmentary perspective view illustrating exemplary means for turning the cases through 90°, lowering the cover members, applying foam and scrubbing the bottom, side walls and cover surfaces of the case.

FIGURE 7 is a fragmentary perspective view illustrating the rinsing of the case.

FIGURE 8 is a fragmentary perspective view illustrating the air drying of the case.

FIGURE 9 is a perspective view illustrating the cleaned case as it is delivered from the machine.

Briefly in practice of the invention, the cases are inverted and fed crosswise with their cover flaps open into a powered conveyor which carries them into the machine where they pass through a series of cleaning operations. In an initial operation the inverted cases are contacted by a vibrator which shakes loose any collected dirt or the like on the inside of the case, which dirt is then removed by air jets blowing upwardly into the case. The cases then enter a hooded section of the machine where foam supplied from a foam reservoir tank is sprayed over the end walls of the cases and the end edges of the cover flaps. The foam sprayed areas are then contacted by vertically disposed rotary brushes arranged to contact and scrub the foam sprayed areas. Following this operation, an indexing device turns the cases through 90° so as to deposit them lengthwise of the conveyor, and at the same time the cover flaps are folded downwardly so as to lie planar with the side walls of the cases. A second set of nozzles then applies foam to the side walls, cover flaps and bottom of the cases, whereupon these areas are then scrubbed by rotary brushes. The cover flaps of the cases are then folded outwardly and a foam dissipating cold water spray is played upon both interior and exterior surfaces of the cases. This operation is followed by a series of compressed air jets which direct air over the surfaces of the cases to remove the water. Thereafter the cases are delivered to the exit end of the machine by the powered conveyor and deposited in upright position on a second conveyor or other means for delivering them to their point of use or storage.

As already indicated, the cleaning agent is a soap or detergent, or mixture thereof, which is pumped into a foam reservoir where it is placed under pressure and discharged in the form of foam. Preferably the cleaning agent will comprise a highly concentrated soap and/or detergent solution which is free from excessive amounts of water or other solvent so as to be essentially "dry." By "dry" I do not mean that the cleaning agent is necessarily free from water or other solvent, but rather that the cleaning solution is sufficiently concentrated to produce foam which, when sprayed on the cases, will stick where it is sprayed rather than tend to run down the sides of the cases. Essentially, the ability of the foam to adhere to the walls of the cases is proportional to the amount of water or other solvent present, and hence a "dry" foam may be characterized as one in which the water or solvent content is sufficiently low to provide an adherent, non-migratory coating when applied to a surface to be cleaned. Such a "dry" foam is also non-penetrating in

the sense that it will not unduly wet or strike into the fiberboard surfaces of the cases.

For a more detailed understanding of the invention, reference is now made to FIGURES 1 and 2 of the drawings wherein the machine is indicated generally at **1**, and comprises a suitable supporting frame including horizontal frame members **2** extending lengthwise of the machine and mounting an endless conveyor chain **3** arranged to pass around sprockets **4** and **5** at the leading and trailing ends of the machine, respectively. The conveyor chain, which serves to move the cases through the machine, may be conveniently driven from shaft **6** which mounts trailing sprocket **5**, the shaft also mounting a sprocket **7** adapted to be driven by chain **8** from speed reducer **9** powered by motor **10**. The conveyor chain **3** mounts spaced apart dogs **11**, which are arranged to contact the rearmost surfaces of the cases and advance them through the machine along tracks or guideways **12**, as can be clearly seen in FIGURE 4. In a preferred embodiment of the invention the dogs **11** are on 30″ centers and the conveyor **3** is adapted to be driven at an operating speed of approximately 260 ft. per minute so as to handle approximately 960 cases per hour.

At the leading end of the machine, the cases **13** are placed on the conveyor in inverted position with their cover flaps opened outwardly, the cases being positioned with their end walls **15** paralleling the conveyor. The internal partitions which divide the cases into bottle receiving cells will be removed before the cases are placed on the conveyor.

As the cases are moved along by the conveyor, they are first contacted by an overhead shaker or vibrator **16** comprising a horizontally disposed plate **17** suspended from supporting arms **18** and biased by springs **19** into contact with the uppermost surface or bottoms of the cases. A vibrator unit **20** is secured to the plate **17** so that the plate will be caused to vibrate, thereby shaking loose any dirt or debris which has collected in the case. Such dirt or debris will fall through an opening **21** (FIGURES 2 and 4) and will be collected in a debris bin **22** located beneath a conveyor. Preferably, the shaking operation will be accompanied by a blast of air from beneath to assure the removal of all debris. To this end, and as best seen in FIGURE 4, an air jet **23** may be mounted beneath the opening **21** the jet having a plurality of nozzles or openings **24** arranged to direct compressed air upwardly into the inverted cases.

The air jets just described, as well as other components of the machine utilizing compressed air, will be supplied with air under pressure from a compressor unit **25** which may be conveniently mounted on top of the machine in the manner seen in FIGURE 1.

Upon passage beyond the shaker unit **16**, the cases will enter a hood **26** where they will be subjected to a first washing operation during which the end walls and the ends of the cover flaps will be scrubbed. This operation can be best seen in FIGURE 5 of the drawings wherein foam **27** will be sprayed on the ends of the cases from overhead nozzles **28** fed from foam supply line **29**. As already explained, the nozzles **29** will coat the end surfaces of the cases with an essentially "dry" foam, whereupon the coated surfaces of the cases will be contacted by vertically disposed, power driven rotary brushes **30**. These brushes will have flexible bristles and will serve to scrub the foam coated surfaces of the cases. Preferably, the brushes will be rotated in a direction opposite to the direction of movement of the cases. Preferably, the operation will be repeated by a second bank of foam nozzles **28***a* and rotary brushes **30***a*.

Subsequent to the passage of the cases through the first scrubbing station just described, the cases will be turned through 90° so that they will extend lengthwise of the conveyor. Various forms of sweep mechanism and the like may be employed to turn the cases. In the embodiment illustrated, the turning movement is accomplished

by means of a traveling foot **31** suspended from a horizontally disposed endless chain **32** the flights of which extend parallel to the path of travel of the cases. The chain **32** is adapted to be driven at a speed which is greater than the linear speed of the advancing cases so that the foot **31**, as it passes around trailing sprocket **33**, will contact the rearmost wall of the advancing container and will urge the container forward ahead of its dog **11**. As the case is so advanced, its leading wall will abut against a depending arm **34** which serves as a fixed abutment serving to arrest the forward movement of the case at one corner thereof. The forward movement of the foot **31** contacting the rear wall at the opposite side of the case, will cause the case to pivot about the depending arm, as can be seen in FIGURES 2 and 6, thereby turning it through 90°. As the case completes its turning movement, it will be reengaged by its dog **11**, the dog now contacting the rearmost end wall of the case.

As can be best seen in FIGURE 6, as the case goes through its turning movement, it will be sliding on the guideway **12**, but as the case turns, it will move over reduced guideway portions **12***a* having a width somewhat less than the width of the case. This permits the cover flap **14** to move downwardly to a vertical position in which the cover flap will be in vertical alignment with the side walls of the case.

Just as soon as the cases have assumed their new position, a set of overhead nozzles **35** will spray foam **36** onto the uppermost, bottom surface of the case; and similarly, sets of nozzles **37** will spray the side walls and cover flaps. Following the application of the foam, the bottom wall of the case will be contacted by a horizontally disposed rotary brush **38**, and the side walls and cover flaps by the vertically disposed rotary brushes **39**. As in the case of the initial washing operation, the second stage washing operation will be repeated by a second series of nozzles **35***a*, **37***a* and rotary brushes **38***a* and **39***a*, as can be clearly seen in FIGURES 1 and 2.

As the cases pass from the second washing section, the downwardly extending cover flaps **14** are contacted by sweeps **40** which will fold the cover flaps outwardly to a horizontal position, whereupon they will be reengaged by a section **12***c* of the guideways. The cases are then subjected to a spray, preferably of cold water, from spray nozzles **41** arranged both above and below the cases and positioned to direct a spray on all scrubbed surfaces of the case. It is also desirable to direct the spray into the interior of the case, which may be done from beneath.

Immediately following the water spray, the cases are subject to an air blow-off by means of air jets **42** which, as in the case of the water sprays, are positioned to direct compressed air over all surfaces of the cases, the air nozzles being located above, below, and at the ends of the cases as they pass through the station. Compressed air may be supplied to the air jets directly from compressor **25** or, if desired, the air may be heated so as to assist in the drying of the cases.

Upon passage beyond the blow-off station, the cases will emerge from the hooded section of the machine where, upon passage beyond the trailing end of conveyor **3**, they will drop onto an exit conveyor **43**, the cases in the process of dropping from conveyor **3** to the exit conveyor being uprighted so as to move along the exit conveyor in upright condition with their cover flaps open.

The machine also incorporates as an integral part thereof the mechanism for supplying foam to the various foam nozzles in the two washing sections. To this end, one or more mixing hoppers **44** are provided into which the necessary chemicals are placed. In the embodiment illustrated, dry materials will be placed in the hopper or hoppers **44**, and these chemicals will be subsequently passed, by means of a screw conveyor feeder **45** into a foam mixing tank **46** into which the proper amount of water or other solvent will be introduced through solenoid valve **47**. The soap or detergent concentrate so formed

will then be pumped through pump 48 and conduit 49 to foam reservoir 50 where the concentrate will be subjected to air under pressure from compressor 25. From the foam reservoir 50 the concentrate which, due to the action of the compressed air, will be in the form of foam, then passes through supply line 51 for delivery to the various sets of foam nozzles.

It will be understood, of course, that the hooded portion of the machine will be suitably drained so that the expended foam and water may be removed. This may be conveniently done by providing a trap 52 (FIGURE 2) which may be drained into a sewer or the like through outlet 53.

Modifications may be made in the invention without departing from the spirit of it and, consequently, I do not intend to be limited in the scope of the invention excepting as set forth in the claims which follow. It should be obvious that various arrangements of guideways, side guides, sweeps and the like may be employed, and in the foregoing description I have not endeavored to particularize their construction since such details will be obvious to the skilled worker and would not further the understanding of the invention.

It should be understood that the invention, while primarily intended for cleaning beverage cases, has more far reaching utility and may be utilized to clean diverse types of cartons and the like wherein a problem of scrubbing various wall surfaces is encountered.

Having, however, described my invention in an exemplary embodiment, what I desire to secure and protect by Letters Patent is:

1. A method for cleaning bottle cases and the like which have cover flaps hingedly connected to opposite walls thereof, which comprises inverting the cases and continuously moving them in a path of travel with the cover flaps open, and thereafter subjecting the cases to a plurality of successive cleaning operations employing a foam cleaning agent which is essentially dry when applied, one of said cleaning operations comprising the application of the foam cleaning agent to the walls of the cases adjacent the walls to which the cover flaps are connected and the formation thereon of an adherent-non-migratory layer of foam, followed by the scrubbing of the walls to which the foam has been applied, another of said cleaning operations comprising the simultaneous application of the foam cleaning agent to the walls of the cases to which the cover flaps are connected and to the outer surfaces of the cover flaps and the formation of an adherent, non-migratory layer of foam thereon, followed by the scrubbing of the last named walls and cover flaps, said last named cleaning operation being conducted with the cases turned at a horizontal plane at substantially right angles with respect to the postion they occupied during said first named cleaning operation.

2. The method claimed in claim 1 wherein the cover flaps are opened outwardly at substantially right angles to the body walls to which they are attached during said first named cleaning operation, and wherein said cover flaps are folded so as to be in planar relation to the body walls to which they are attached during the second named cleaning operation.

3. The method claimed in claim 2 wherein one of said cleaning operations additionally includes the application of the foam cleaning agent to the bottom wall of each case and the scrubbing thereof.

4. The method claimed in claim 3 wherein said cleaning operations are followed by a cold water rinse and an air blow-off of the rinse water of all scrubbed surfaces.

5. In a device for cleaning bottle cases and the like having a bottom, side and end walls, and cover members hingedly connected to the upper edges of the side walls, an elongated hood having an entrance end and an exit end, guideways extending through said hood and projecting outwardly beyond both the entrance and exit end thereof along which the cases are adapted to move in inverted position in a horizontal path of travel, continuously moving conveyor means for moving the cases along said guideways in spaced apart relation with opposite body walls thereof extending parallel to their path of travel, the portion of the guideways projecting from the entrance end of said hood being positioned to receive the cases with their cover members lying in out-folded position and extending transversely of their path of travel, shaker means in advance of the entrance end of said hood for shaking the cases to remove loose dirt therefrom, said shaker means overlying the path of travel of the cases and positioned to contact the inverted bottoms thereof, a first cleaning station within said hood, spray means at said first cleaning station for applying a foam cleaning agent to the end walls of the cases, rotary brush means immediately beyond said spraying means for contacting and scrubbing the end walls of the cases, an indexing station beyond said first cleaning station, means at said indexing station for turning said cases through substantially 90° in a horizontal plane so as to bring the side walls of the cases into parallel relation to the said path of travel, means for folding the cover members of the cases downwardly into co-planar relationship with the side walls to which they are articulated, a second cleaning station beyond said indexing station, spraying means at said second cleaning station for applying a foam cleaning agent to the side walls of the cases and the other surfaces of the downwardly extending cover members, rotary brush means immediately beyond said last named spraying means for contacting and scrubbing both the side walls of the cases and the outer surfaces of the cover members, means for thereafter spraying the scrubbed surfaces of the cases with water, including means for stripping excess moisture from the cases and for outfolding the said cover members, whereby the cases are delivered from said device in cleaned condition ready to be filled, said device including means associated with one of said cleaning stations for applying foam cleaning agent and scrubbing the bottom of the inverted cases.

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