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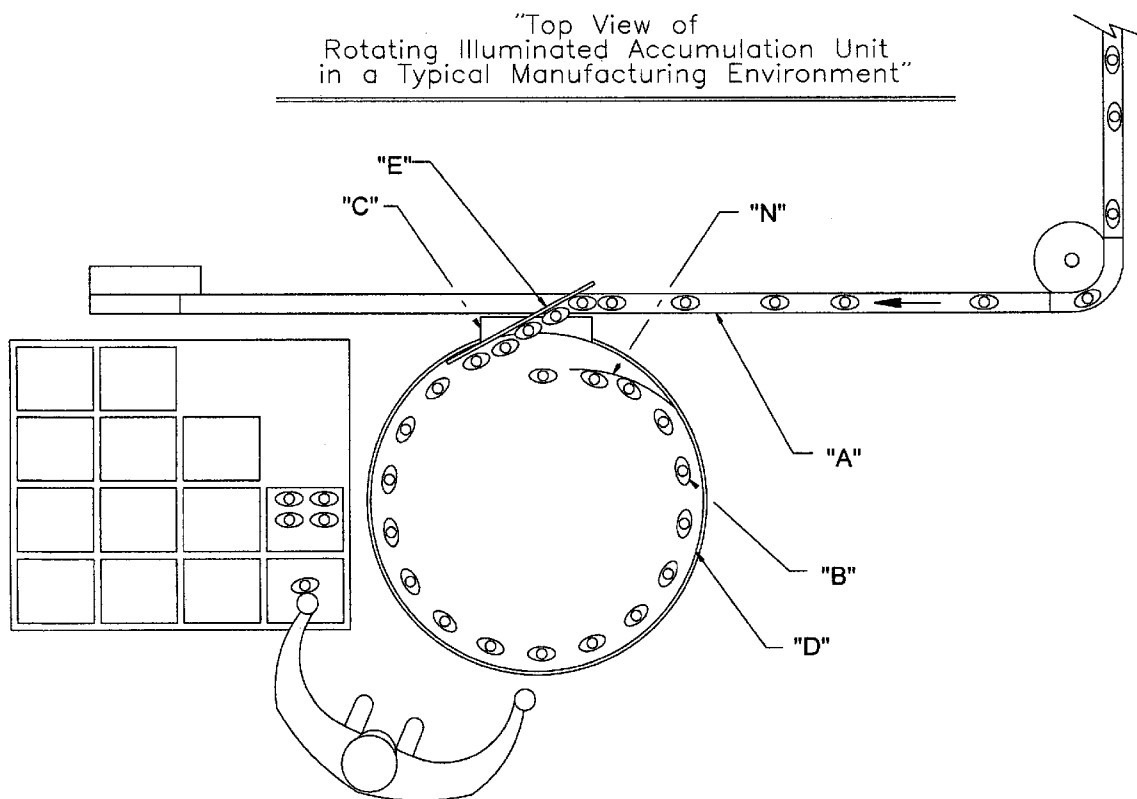
(19) **United States**(12) **Patent Application Publication**
Ogden(10) **Pub. No.: US 2010/0209218 A1**(43) **Pub. Date: Aug. 19, 2010**(54) **ROTATING ILLUMINATED ACCUMULATION
UNIT FOR TRANSPARENT CONTAINERS OR
OTHER OBJECTS**(52) **U.S. Cl. 414/222.01**(76) **Inventor: David Kirk Ogden, Pocahontas, IL
(US)**

Correspondence Address:
David Ogden
16830 Baumann Road
Pocahontas, IL 62275

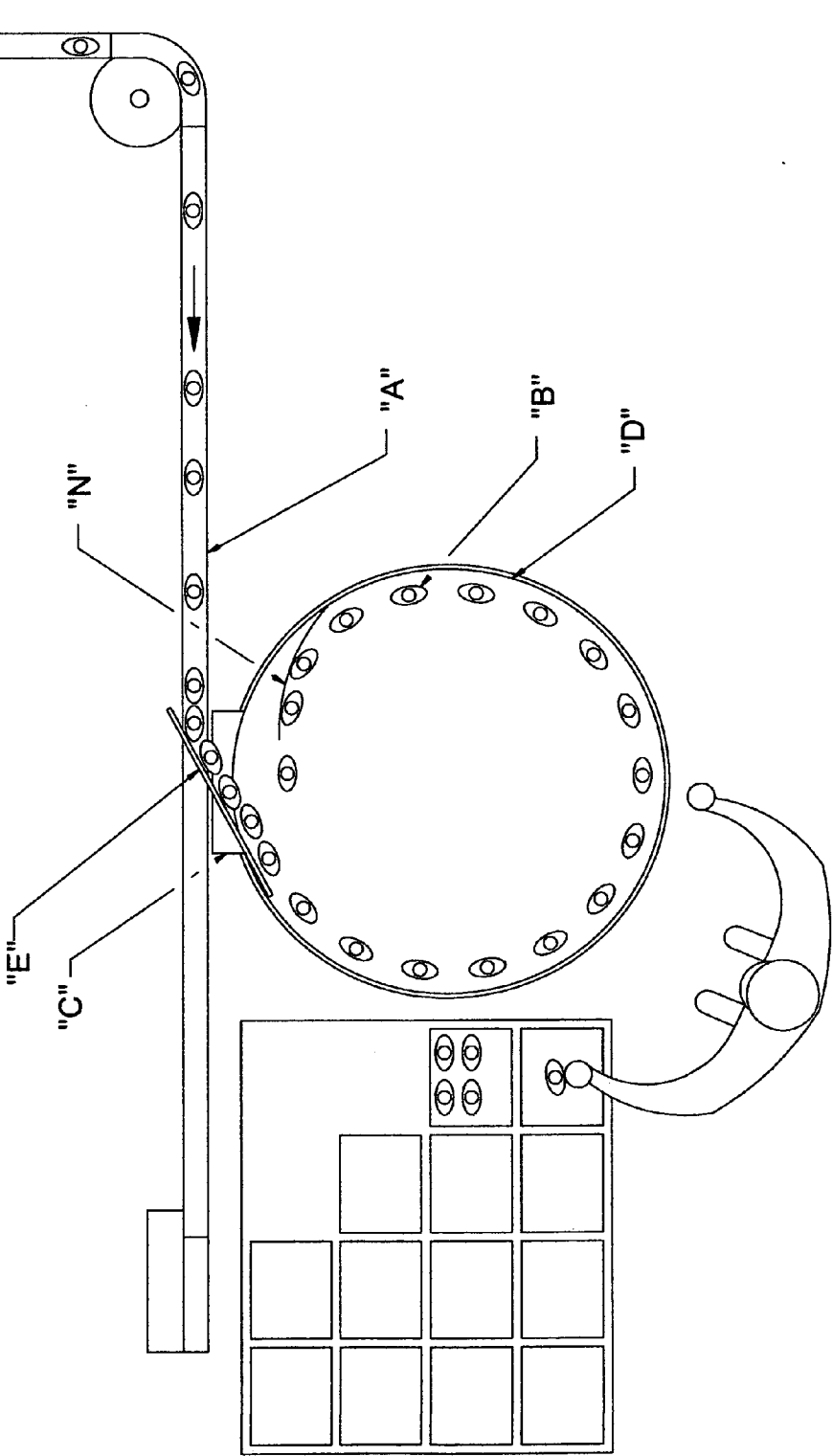
(21) **Appl. No.: 12/228,079**(22) **Filed: Feb. 19, 2009****Publication Classification**(51) **Int. Cl.**
B65H 11/00 (2006.01)(57) **ABSTRACT**

The inventor lays claims to a "continuously rotating and illuminated accumulation table onto which a stream of manufactured objects, such as transparent bottles, are directed from a conveyor." The rotating accumulation unit is comprised of (three) principle components; a driven disc, a lamp or illumination device, and a flat, smooth translucent accumulation surface. Vertical orientation of objects, such as bottles, is maintained while the illuminated accumulation surface provides backlighting for visual inspection of the objects.

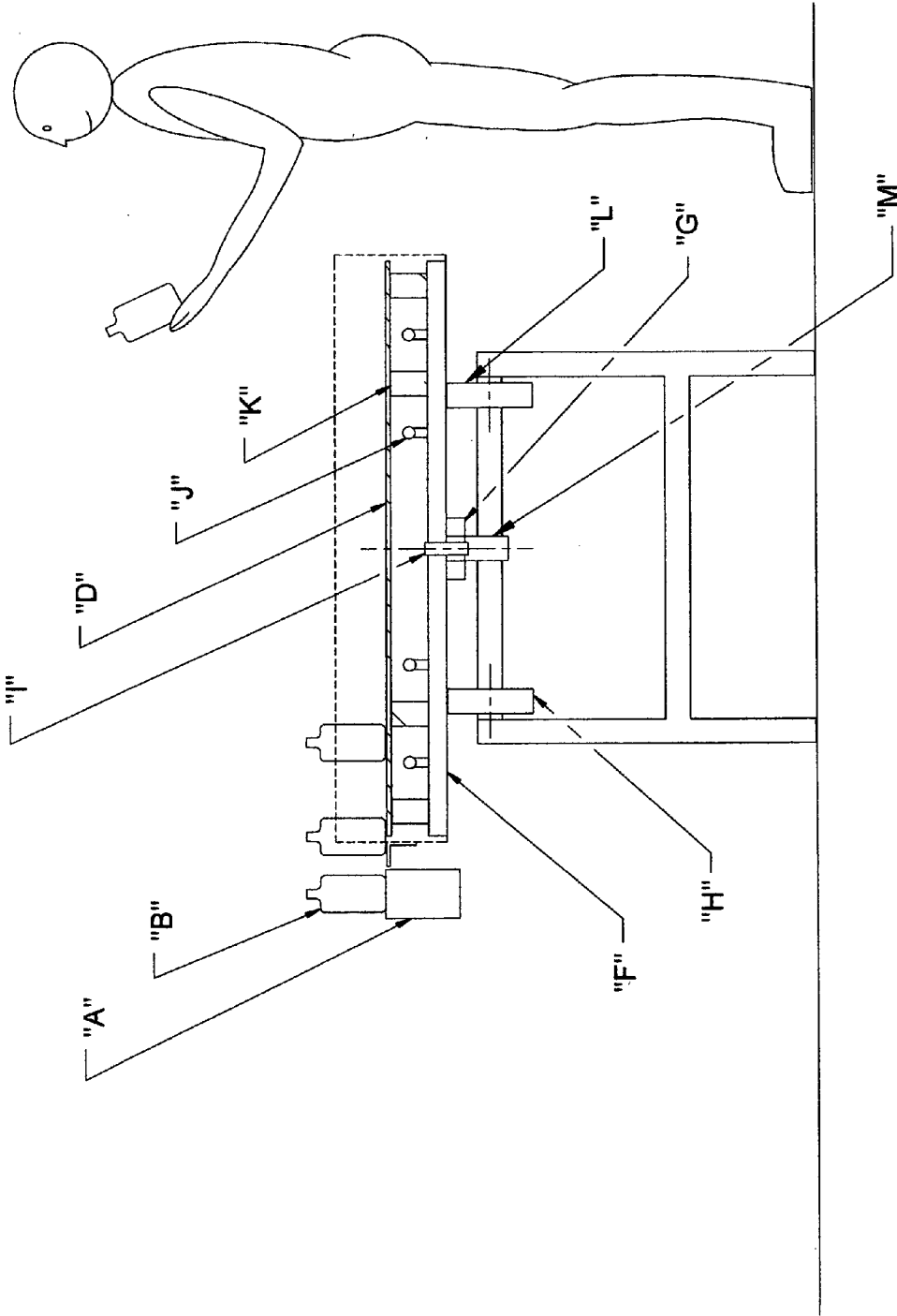
This method of simultaneously accumulating and backlighting transparent plastic bottles or similar products provides the dual benefits of improved workplace ergonomics for off-packing as well as an enhanced opportunity to identify and cull products which do not meet quality standards.



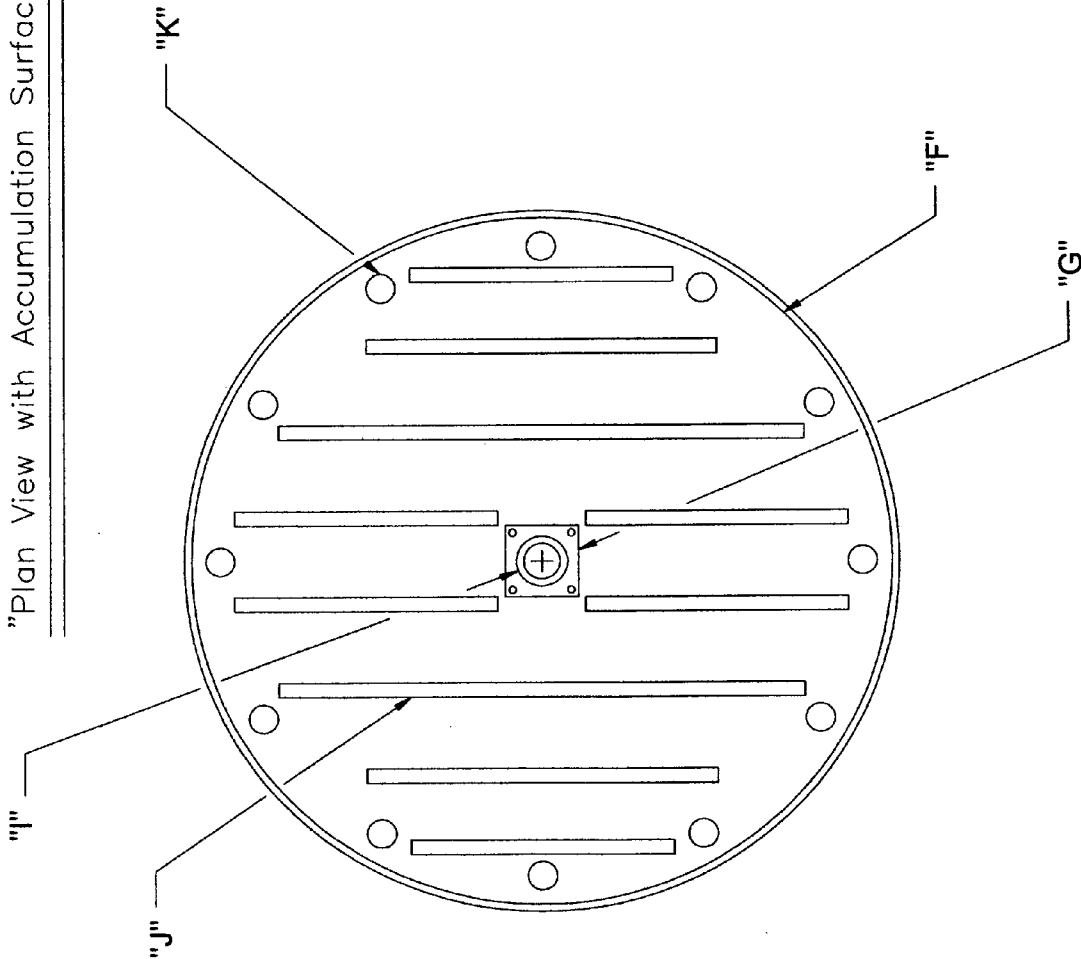
DRAWING ONE
"Top View of
Rotating Illuminated Accumulation Unit"
in a Typical Manufacturing Environment"



DRAWING TWO
"Section View of Accumulation Unit"



DRAWING THREE
"Plan View with Accumulation Surface Removed"



ROTATING ILLUMINATED ACCUMULATION UNIT FOR TRANSPARENT CONTAINERS OR OTHER OBJECTS

BACKGROUND

[0001] In the course of manufacturing many objects, such as transparent bottles, said products are conveyed through a series of manufacturing, decorating and/or finishing operations upon one or more conveyors. It is desirable to maintain a vertical, upright orientation of the objects through each process, through and including the final operation, typically the packing-off of the bottles or other objects into boxes or shipping cartons.

[0002] It is highly desirable to conduct a visual inspection of bottles or products before they are packaged for shipment. These visual inspections may range from a regimented quality assurance program to a cursory visual monitoring of the manufacturing process. Visual inspections to find impurities and/or imperfections in transparent products, such as PET bottles, are best performed by backlighting or ‘candling’ and allowing light to pass through the transparent object.

[0003] In a typical industrial environment the primary available light source is located above the production area, such as the light provided by ceiling mounted luminaries or fluorescent lighting fixtures. The lighting is therefore in a vertical-down direction, and reflective in nature with respect to the product or bottles. This reflective lighting is an extremely poor environment for performing an effective visual inspection of a transparent object. As an unintended result of this inherent inability to readily identify impurities and imperfections, non-compliant and defective products or bottles are often shipped to customers.

DESCRIPTION OF DRAWINGS

[0004] Drawing One—“Top View of Rotating Accumulation Unit in a Typical Manufacturing Environment”. This drawing depicts the inventor’s claimed device as it would be typically integrated with a tabletop conveyor in the manufacture of plastic bottles or other similar products. A representation of a human operator involved in pack-off activities and reshipment cartons are included to provide context.

[0005] Drawing Two—“Section View of Accumulation Unit”. This section view drawing depicts in elevation various components including those located beneath the accumulation surface (“D”) which impart rotation to the table and back illumination of the in-process good or products. A representation of a standing human and in-process product is included to provide context and special relationships.

[0006] Drawing Three—“Plan View with Accumulation Surface Removed”. This ‘plan’ or top view drawing depicts the claimed rotating accumulation unit with the table surface (“D”) removed, for the purpose of this illustration, of providing an unobstructed view of a typical arrangement of lamps (“J”), and related components which impart illumination to the accumulated product.

EXPLANATION OF DRAWINGS

[0007] Item A—A typical “tabletop conveyor” as used in many industrial manufacturing environments for the transportation of in-process items such as plastic bottles. (Item “A” is not part of claim, but depicted for reference purposes)

[0008] Item B—A typical in-process “object” or product, such as a transparent bottle. (Item “B” is not part of claim, but depicted for reference purposes)

[0009] Item C—A “shed plate” for supporting bottles or other objects (item “B”) while being transferred from the conveyor (“A”) to the rotating accumulation surface (“D”).

[0010] Item D—A continuously rotating illuminated “accumulation surface” which provides an area for accumulating transparent bottles or other in-process objects (“B”). This flat, smooth accumulation surface is fabricated from a commercially available material such as an acrylic polymer with translucent or transparent optical properties.

[0011] Item E—A “transfer fence” which causes passive transfer or movement of bottles or other upright objects (“B”) from conveyor (“A”) across the shed plate (“C”) and onto the rotating accumulation surface (“D”).

[0012] Item F—A continuously rotating “table disc” which provides support for the lamps (“J”), spacers (“K”), and the accumulation surface (“D”). The table disc rotates about a vertical axis as maintained by a flange bearing (“G”).

[0013] Item G—A commercially available “flange bearing” is bolted to the underside of the table disc (“F”). The bore of the flange bearing is engaged over the hollow shaft (“M”).

[0014] Item H—A rotating “drive wheel”, typically driven by an electric motor as prime mover, which imparts rotational thrust by its contact to the underside of the table disc. The drive wheel rotates on a horizontal axis which is tangential to the centerline of the flange bearing (“G”).

[0015] Item I—A “commutator” or similar commercially available rotary electrical coupling provides a current path for electrical power to energize the lamp or array of lamps (“J”). The commutator is inserted and affixed inside the hollow shaft (“M”).

[0016] Item J—A lamp or an array of “lamps”, typically T8 fluorescent lamps and associated ballasts and lamp holders, which impart illumination to the underside of the translucent accumulation surface (“D”).

[0017] Item K—An array of “spacers” provide support of the translucent accumulation surface (“D”) and are mechanically attached to the table disc (“F”). These spacers would typically be constructed from a transparent plastic materials such as an acrylic rod.

[0018] Item L—Three or more “idler wheels” support the weight of the table disc (F), and all items attached thereto, and any objects (“B”) in accumulation. Each idler wheel rotates on its own individual horizontal axis which is tangent to the centerline of the flange bearing (“G”).

[0019] Item M—A “hollow shaft” provides the stationary point of attachment for the center race of the flange bearing (“G”), allowing the table disc (“F”), and all related items to rotate about a fixed vertical axis. The inner area of the hollow shaft is the location of the commutator (“I”).

[0020] Item N—The “push-back fence” causes passive movement of the objects or transparent bottles (“B”) toward the center of the accumulation surface (“D”), and

thus provides a clear path for additional objects ("B") as they enter via the shed plate ("C").

Description of the Claim and Invention

[0021] 001) It is a common and accepted practice in the manufacture of many objects, including plastic containers, for these products or objects to be transported by tabletop conveyors through various manufacturing operations.

[0022] 002) It is generally desirable that the objects or bottles described in paragraph 001 remain organized in an upright orientation and not allowed to become disorganized or assume random orientation. Maintaining an organized, upright orientation of the product facilitates automated manufacturing operations such as finishing, decoration and/or inspection.

[0023] 003) For example, it is common and accepted practice in the manufacture of plastic bottles to maintain upright orientation of the bottles so as to accommodate automated processes including leak detection, surface flame treatment, and/or label applications processes.

[0024] 004) It is common and accepted practice that the final operation in the manufacturing process is often a 'pack-off' activity. In the pack-off operation, plastic containers or other products are manually placed into boxes or cartons to facilitate shipment to the filling plant or customer.

[0025] 005) In many manufacturing and/or packaging operations, it is desirable to accumulate objects or products, such as bottles, for varying periods of time to accommodate downstream production interruptions and fluctuations, employee break periods, maintenance operations, packing-off activities, and/or other activities, whether they be planned or unexpected while allowing upstream operations to run without interruption.

[0026] 006) It is often desirable that product accumulation as described in paragraph 005 be provided in a space or area more compact than that may be afforded by simply accumulating the product atop a conveyor.

[0027] 007) Maintaining the upright orientation of objects in accumulation or queue at the pack-off station as described in paragraphs 004 and 005 improves the human ergonomics and efficiency of the manual pack-off operation.

[0028] 008) It is desirable that products in accumulation at the pack-off station remain in controlled, continuous rotary motion so that the product is continuously coming into the operator's range of motion. This reduces unproductive human movement and improves the ergonomics of the manual pack-off process where product is loaded into cardboard boxes or other containers.

[0029] 009) It is advantageous that an improved means of visual inspection be provided while the objects, such as transparent bottles, reside in accumulation at the pack-off station such as described in paragraphs 007 and 008.

[0030] 010) Please reference attached "Drawing One" which depicts a pack-off station and typical surrounding manufacturing environment as described in paragraphs 005, 006, 007, and 008 in which a conveyor ("A") transports transparent plastic bottles or similar objects ("B") from an upstream manufacturing process onto the rotating accumulation surface ("D").

[0031] 011) Container transfer to the accumulation unit as depicted in "Drawing One" is facilitated by a transfer fence ("E") which imparts a tangential force on the bottles or other oriented objects ("B") and causes them to transfer from the conveyor ("A"), across a shed plate ("C"), and onto the rotat-

ing accumulation surface ("D"). This transfer process provides benefit of the Inventor's 'Claim I', of "a means for accumulating in-process goods or products, such as plastic containers, in a convenient, self-loading manner so as to need no human action or intervention".

[0032] 012) The illuminated accumulation surface ("D") described in this claim is in continuous rotation and provides an area for accumulation of objects or transparent bottles ("B"). The containers or similar objects remain in an upright orientation, thus achieving the Inventor's 'Claim II', and thus "provide a means of maintaining the vertical orientation and organization of accumulated goods or products, such as plastic bottles, such as is often required or desirable in an industrial manufacturing environment".

[0033] 013) "Drawing Two" provides a section side view of the accumulation surface ("D") and the various components required to provide illumination, impart rotation, and provide mechanical support. The translucent accumulation surface ("D") is mechanically supported by an array of spacers ("K") above the table disc ("F"). The spacers ("K") are mechanically attached to the table disc ("F").

[0034] 014) The axis of rotation of the table disc ("F") and attached components are maintained by a flange bearing ("G"). The center race of this commercially available flange bearing ("G") is engaged over the outer surface of a fixed hollow shaft ("M").

[0035] 015) The weight of the entire rotating portion of the accumulation unit [summation of the accumulation surface ("D"), table disc ("F"), lamps ("J") and spacers ("K")] are supported by a series of three or more idler wheels ("L"). Each idler wheel rotates on its individual horizontal axis which is tangent to the centerline of the flange bearing ("G").

[0036] 016) Rotation of the table disc ("F"), and attached components as described in paragraph 015 is imparted by the rotation of a "drive wheel" ("H"). Rotation of the drive wheel would be typically be provided by an electric motor or motor/gearbox combination which serves as the prime mover of the rotating portion of the system.

[0037] 017) The drive wheel ("H") imparts rotational thrust to the underside of the table disc ("F"). The drive wheel rotates on a horizontal axis which is tangential to the centerline of the flange bearing ("G").

[0038] 018) It is desirable that the rotational torque of the accumulation surface is limited to a force which reduces the opportunity of injury to personnel. In the event of a material blockage or other obstruction, the drive wheel ("H") may break traction with the underside of the table disc ("F"). The use of only friction as the mechanical coupling between the drive wheel ("H") and table disc ("F") provides the Inventor's 'Claim III' of "an inherently safe method of driving the rotating portion of the accumulation system so as to reduce or eliminate the opportunity of pinch point injury to personnel".

[0039] 019) Containers or other objects are in continuous rotational movement, atop the accumulation surface ("D"), eliminating the need for the operator to reach or walk to retrieve, pack or remove objects from the accumulation surface. This provides the benefit of "Claim IV", Provide improved ergonomics for personnel involved in selecting, culling, removing, or repackaging accumulated goods or products".

[0040] 020) "Drawing Three" provides a detailed view of the various components required to provide illumination of the translucent accumulation surface ("D") and objects ("B") residing thereon.

[0041] 021) In “Drawing Three”, the accumulation surface (“D”) is removed, revealing a commutator or similar commercially available rotary electrical coupling (“I”). The rotary electrical coupling (“I”) provides a path for electrical power to reach the interior of the rotating portion of the accumulation unit, and thus energizes the lamp or array of lamps, (“J”). The commutator is inserted and affixed inside the stationary hollow shaft (“M”).

[0042] 022) An array of lamps (“J”), such as commercially available T8 fluorescent lamps, reside between the table disc (“F”) and translucent accumulation surface (“D”). Light produced by lamps (“J”) is emitted upward through the translucent accumulation surface (“D”) and provides the desired backlighting or ‘candling’ of transparent bottles or other objects (“B”).

[0043] 023) An array of spacers (“K”) provides vertical support of the translucent accumulation surface. The spacers, expected to be constructed from a commercially available material such as transparent acrylic rod, are mechanically attached to the table disc (“F”) and portions of the accumulation surface (“D”).

[0044] 024) The backlighting of objects as described in paragraph 022 provides a substantial improvement in the opportunity for human operators such as those described in paragraphs 007 and 008 to identify and remove contaminated, misformed, or otherwise non-compliant objects (“B”).

[0045] 25) The identification of non-compliant objects provides an opportunity to make process adjustments. The culling of non-compliant objects, such as contaminated or malformed transparent plastic bottles, resulting in an improvement to the quality of objects supplied to the end-user

or customer of said objects. This provides the benefit of the Inventor’s ‘Claim V’ by “backlighting of accumulated goods or products so as to improve the observation of potential defects or irregularities in transparent or translucent objects, such as transparent plastic bottles”.

SUMMARY OF CLAIMS

[0046] The Inventor claims his ‘illuminated rotary accumulation unit’ provides the user with a summation of each of the following benefits which are not simultaneously available in any existing packaging or manufacturing equipment design.

I). Provide a means for accumulating in-process goods or products, such as plastic containers, in a convenient, self-loading manner so as to need no human action or intervention.

II). Provide a means of maintaining the vertical orientation and organization of accumulated goods or products, such as plastic bottles, such as is often required or desirable in an industrial manufacturing environment.

III). Provide an inherently safe method of driving the rotating portion of the accumulation system so as to reduce or eliminate the opportunity of pinch point injury to personnel.

IV). Provide improved ergonomics for personnel involved in selecting, culling, removing, or repackaging accumulated goods or products.

V). Provide backlighting of accumulated goods or products so as to improve the observation of potential defects or irregularities in transparent or translucent objects, such as transparent plastic bottles.

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