April 17, 1962 W. B. EDDISON ET AL 3,029,499

RING FEEDING APPARATUS

Filed Sept. 25, 1958 3 Sheets-Sheet 1

FIG. 1.

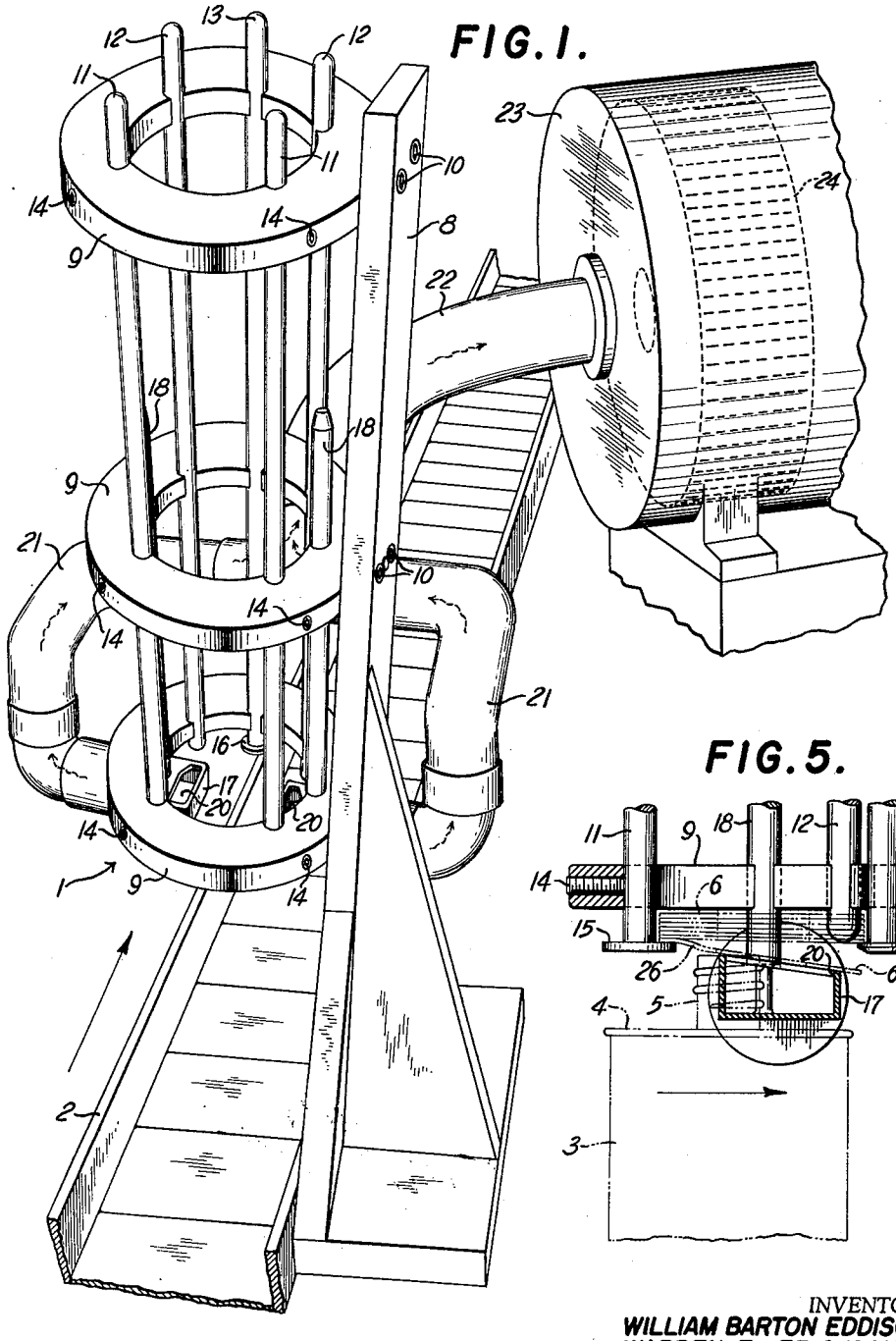



FIG. 5.




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FIG. 2.

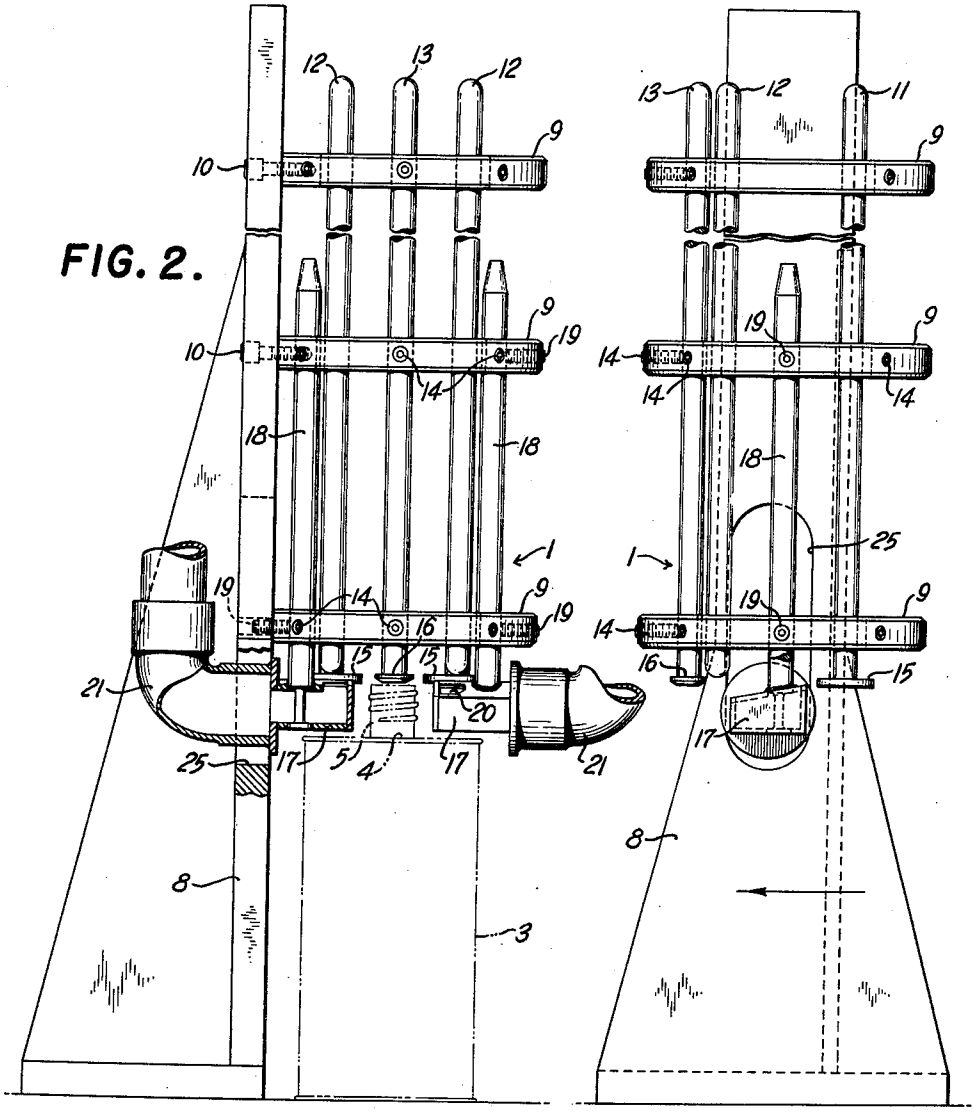






FIG. 3.

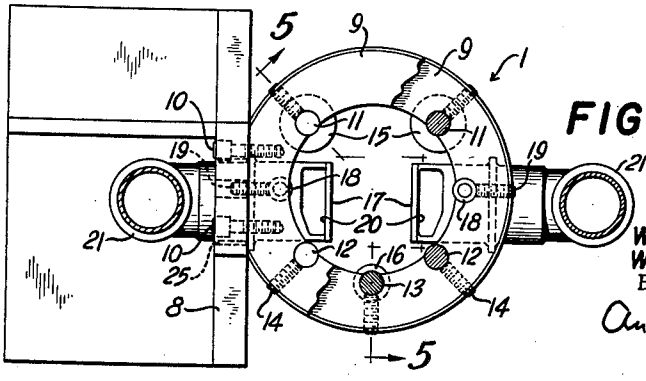



FIG. 4.

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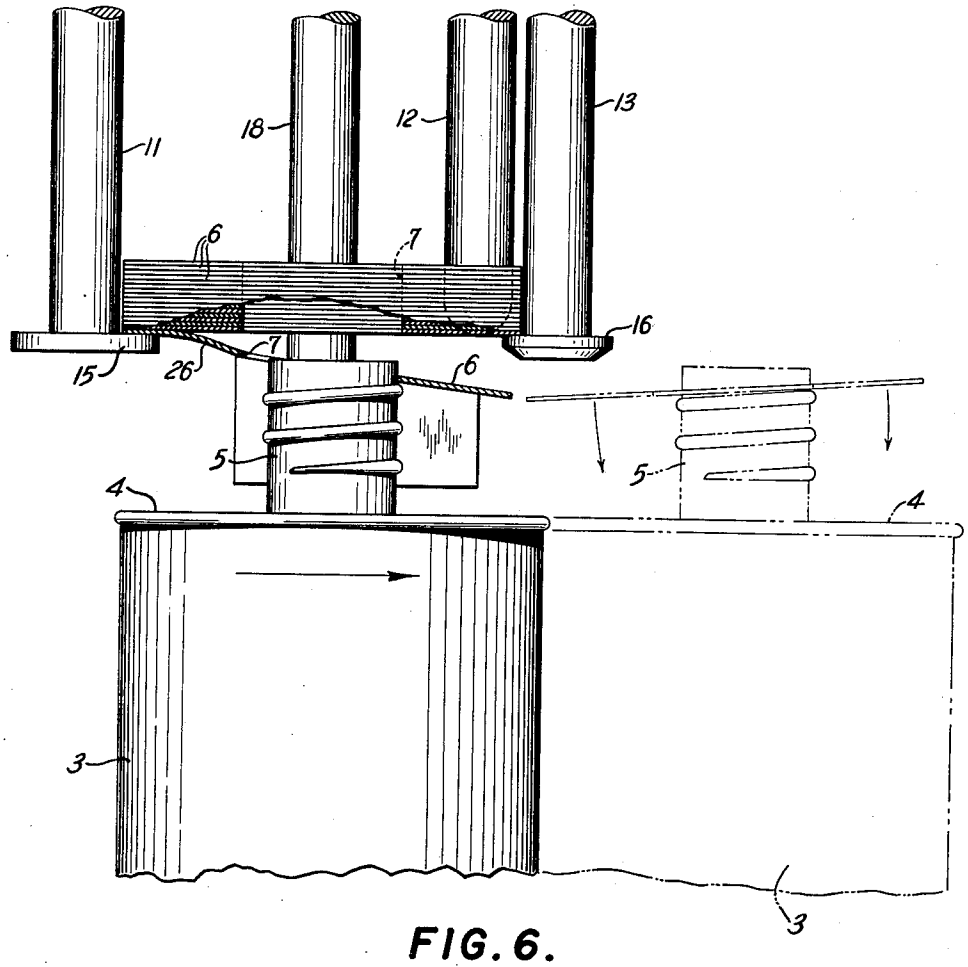



FIG. 6.

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# RING FEEDING APPARATUS

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5 Claims. (Cl. 29—208)

This invention relates to a stack feeding apparatus, more particularly to an apparatus and for dispensing one item at a time from a stack of items disposed in a magazine or the like.

Heretofore, machines have been developed which utilize a suction or mechanical device adapted to move into contact with the end item in a stack and remove the item for subsequent application as desired. These machines have of necessity been extremely complicated and have included numerous interconnected moving parts, thereby providing high initial cost and maintenance problems.

A need has been felt in certain industries, especially that of packaging, for a stack feeding device which would be highly simplified and yet would perform as well as or better than prior developments.

The present invention solves the problem and provides a device which is capable of separating successive ring-like items from a stack at an almost unlimited speed, and which is simplified to such an extent that no moving parts are utilized.

The invention is based on the utilization of a fixed suction device using relatively high volume of air or other fluid flow, together with a relatively low vacuum.

In one application, the invention is contemplated for use as an apparatus for successively applying thin impermeable flexible cardboard, ring-like discs to containers for advertising purposes. The discs are disposed in a magazine, with the bottom disc suitably supported and spaced above a suction head. The suction head is connected to a source of high volume of air flow with the source being capable of producing a low vacuum. The high volume flow causes a low pressure area whereby the lowermost disc is caused to be partially removed from the stack and carried a relatively substantial distance to the suction head, while the low vacuum at the head firmly holds the disc in prepared partially detached position but offers little resistance to removal of the disc laterally for application to the container.

The accompanying drawings illustrate the best mode presently contemplated by the inventors for carrying out the invention.

In the drawings:

FIGURE 1 is a perspective view of an apparatus constructed in accordance with the invention;

FIG. 2 is a vertical elevation of the apparatus viewed from behind FIGURE 1, and with parts broken away in section;

FIG. 3 is a vertical elevation of the apparatus viewed from the left of FIG. 1, and with parts removed for clarity;

FIG. 4 is a top plan view of the device, with parts broken away;

FIG. 5 is a vertical section of the lower end portion of the magazine and the suction head taken on line 5—5 of FIG. 4, and showing a stack of discs and a container in phantom; and

FIG. 6 is an enlarged view similar to FIG. 5 showing the disc pick-off operation.

As shown in the drawings, the stack feeding apparatus 1 is adapted to be supported adjacent a conveyor 2 along which a plurality of containers 3 are moved in succession

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at a desired speed. Each container 3 is shown as being cylindrical in shape with a relatively flat top 4 and a central vertically extending spout 5. It is desired to apply a circular disc 6 having central opening 7 over spout 5 and into seated engagement with top 4 of each container 3, with the disc carrying advertising matter or the like.

Apparatus 1 applies such discs to the stream of containers, and comprises an upwardly extending bracket 8 to which three vertically spaced horizontal annular magazine rings 9 are secured by screws 10 or the like. Rings 9 are disposed in axial alignment and receive a pair of spaced vertical front magazine rods 11 and a similar pair of rear magazine rods 12 therethrough. An additional similar rod 13 is disposed between rods 12 for purposes to be described. Rods 11, 12, and 13 extend from above top ring 9 to slightly below bottom ring 9 and are adjustably secured to the rings by suitable set screws 14. The rods are shown as extending slightly inwardly from the inner edge of rings 9, and are spaced circumferentially to provide a retaining means and slide support for a vertically disposed stack of discs 6, best shown in FIGS. 5 and 6.

A ring-like support ledge 15 is secured to the lower end of each front rod 11. Each ledge 15 is shown as having a flat horizontal top surface and a vertical edge, and is adapted to support the forward portion of the bottom disc 6 and thus the stack within the magazine. A ledge 16 is also provided at the lower end of rod 13, for supporting the rearward portion of the stack, with the support being disposed in a vertical plane passing through the center longitudinal axis of conveyor 2. Ledge 16 also has a flat top surface, and a vertical edge, but the lower face thereof is tapered downwardly and inwardly from said edge.

Ledges 15 and 16 provide a three-point support for the stack of discs 6.

The suction apparatus for removing the discs from the magazine in preparation for application to containers 3 comprises a pair of fixed non-moving vacuum heads or support pads 17 spaced a relatively substantial distance beneath ledges 15 and 16. Each pad 17 is secured in place by a pad support rod 18 which is shown as welded thereto and which extends upwardly through rings 9, similarly to rods 11, 12 and 13. Each support rod terminates above middle ring 9 and is secured by set screws 19. Loosening of set screws 19 permits vertical adjustment of rods 18 and thus pads 17, to properly space the latter from the bottom disc.

The magazine and pads 17 are dispose dto permit passage of containers therebeneath with clearance provided between pads 17 for passage of spout 5 therethrough and with ledge 16 disposed slightly above the top of the spout.

As best shown in FIGS. 1 and 4, each pad 17 is hollow and is provided with a flat top surface tilted in the direction of the path of travel of the containers and having a relatively large elongated opening 20 therein. It has been found that in the particular application, the upper side of the tilted surface can be spaced about 3/16 of an inch from the bottom of the lower disc, while the lower side can be spaced about 3/8 of an inch from said bottom. Openings 20 are spaced laterally on each side of the central longitudinal conveyor axis, and the outer rearward edge portions thereof are tapered. The pad surfaces are tapered downwardly toward the rear.

Pads 17 are connected through a pair of relatively large conduits 21, which are joined to a single central conduit 22, the latter being connected to a suitable air blower 23 having air driving means such as a centrifugal fan

24. One conduit 21 passes through a vertical slot 25 in bracket 8 for adjustment purposes.

For proper operation of the apparatus of the invention, it has been found necessary to provide a blower which can move a substantial volume of air while creating a relatively low vacuum. A centrifugal Spencer-type blower which is capable of moving approximately 75 cubic feet of free air per minute and creating a vacuum of approximately 1½ inches of mercury has been found suitable. This contrasts sharply with mechanical vacuum pick-off devices which have utilized pumps creating air movement of up to 12 cubic feet per minute and a high vacuum of up to 25 inches of mercury. The volume-to-vacuum ratio is thus 75/1.5 or 50, instead of 12/25 or approximately ½.

Orifices 20 are of such size in relation to the cross sectional area of conduits 21 and 22 as to provide most of the pressure drop in the system at the pads.

*Operation*

Assume that a stack of discs 6 is placed in the magazine, with the bottom disc supported on ledges 15 and 16. When blower 23 is turned on, a high volume of air will be pulled inwardly through openings 20. This large air flow creates a differential in pressure between the bottom and top surfaces of the bottom disc, and the higher atmospheric pressure acting on at least a portion of the top surface thereof will cause the disc to be moved downwardly toward pads 17. The high air flow will be sufficient to cause the rear edge of bottom disc 6 to slip downwardly off ledge 16, but ledges 15 are of sufficient width to be detached from the stack and to maintain the disc thereon. The detached portion of the disc is carried or attracted into contact with pads 17 and is held in slanted fixed position by the low vacuum at openings 20, as best shown in FIG. 6. The moment bottom disc 6 contacts pads 17, the high air flow is shut off, the bottom disc thereby acting as a shut-off valve to prevent pull-down of the next adjacent disc in the stack. No external intricate timed valving is necessary.

The tapered top surfaces of pads 17 provide a slight bend or bulge 26 in the forward portion of the disc, and position the deformed rear portion thereof sufficiently below ledge 16 to be disposed in the path of a container spout 5. The disc is now ready for pick-off.

As a container 3 moves down conveyor 2, the spout 5 will pass beneath the upper portion of the downwardly tiltered disc but the upper end of the spout will come into engagement with the lower rear edge of the disc opening, as shown in FIG. 6. Since the container moves continuously on the conveyor, continued movement of the containers will cause spout 5 to move the disc horizontally rearward. The disc will drop down from ledges 15 to thereby be completely separated from the stack and will slide off pads 17. Once the disc is free of the pads, it will immediately drop down onto flat top 4.

The vacuum incident at openings 20 is sufficient to firmly hold the disc in place before pick-off, but must be low enough in holding power to permit relatively easy lateral sliding of the disc from the pads. It has been found that a high vacuum would produce such drag on a laterally sliding disc as to cause severe distortion and even ripping of the disc.

As the bottom disc is removed from pads 17, the valve action of the disc is reduced, permitting high volume air flow and pull-down of the next adjacent disc in preparation for pick-off.

The embodiment described is extremely fast acting, a new disc being readied for pick-off almost instantaneously with pick-off of a prior disc. When a stream of adjacent containers move down the conveyor, the apparatus can easily apply at least ten discs to ten successive containers within one second.

The invention provides a dispensing concept whereby one item at a time is quickly and accurately separated from a stack of items. No moving parts are used for the separation, which relies on a continuous supply and flow of air sufficient to carry the item or element away from the stack, together with a vacuum which holds the item but permits easy removal thereof without damage. The item itself acts as a valve to control the flow of air.



Various modes of carrying out the invention are contemplated as within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

We claim:

1. Apparatus for applying a plurality of impermeable rings or the like in succession to containers moving along a path in succession, comprising, a vertical magazine having a plurality of supports disposed at one end for supporting a vertical stack of said rings thereon, and stationary means fixedly spaced below said supports for distorting the bottom ring in said stack by attracting said bottom ring out of engagement with some but not all of said supports and into the path of said containers so that a container will engage the inside portion of the deformed ring and remove it laterally from the stack.

2. The apparatus of claim 1 in which said stationary means comprises a fixed vacuum head supplied with a flow of air at relatively high volume but low vacuum, said head including a surface tilted in the direction of the path of travel of the containers for receiving and fixedly holding the distorted portion of the bottom ring in the path of the moving containers.

3. The apparatus of claim 2 in which the stack supports include a plurality of ledges of varying width, said ledges being positioned so that said vacuum head will draw the bottom ring off of a narrower ledge but not a wider ledge.

4. Apparatus for applying a plurality of deformable impermeable ring-like elements in succession from a stack to a plurality of containers or the like moving in succession adjacent the stack, comprising, means for supporting said stack above the path of the moving containers, and stationary means for tilting the bottom element in the stack in the direction of the path of container travel by moving one portion downwardly into the path of said containers while leaving another portion thereof in its original position in the stack, so that a moving container will engage the inside prtion of the tilted element and remove the latter laterally from the stack.

5. Apparatus for applying a plurality of impermeable rings or the like to containers moving in succession along a path, comprising, a magazine adapted to hold a vertical stack of rings therein, a plurality of spaced ring supports disposed at the bottom of said magazine and above the path of the containers, a vacuum head spaced from the lower end of said magazine and fixed relative thereto, said head having an upper ring-receiving surface tilted in the direction of said path, fluid supply means connected to said vacuum head to produce a continuous flow of fluid between the bottom ring and the head and in such quantity as to carry the said bottom ring away from the next adjacent ring in the stack and away from some but not all of said supports and into engagement with said tilted surface so that the bottom ring is moved into the path of the containers and the fluid flow is temporarily cut off, said vacuum head and fluid supply means maintaining a vacuum on said end ring sufficient to hold the latter thereto while permitting lateral sliding removal of the latter from the head without substantial distortion of the end ring, said vacuum head being positioned so that as a plurality of containers move beneath said stack in succession a container engages the inside portion of the tilted ring and carries it laterally from the head to thereby re-establish said fluid flow for removal of the next adjacent ring by the next container.

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# CERTIFICATE OF CORRECTION

Patent No. 3,029,499 April 17, 1962

William Barton Eddison et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 10, after "apparatus," insert -- and --; line 11, strike out "and"; column 2, line 50, for "dispose dto" read -- disposed to --; column 3, line 31, after "to", second occurrence, insert -- be detached from the stack and to --; line 33, strike out "to be detached from the stack and"; line 48, for "tiltered" read -- tilted --; column 4, line 43, after "portion" insert -- thereof --; line 46, for "prtion" read -- portion --.

Signed and sealed this 31st day of July 1962.

(SEAL)

Attest:

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