United States Patent [19]

Hurd

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[54] **ORIENTING APPARATUS FOR CAP-SHAPED MEMBERS**

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[52] **U.S. Cl.** **302/31,** 198/268, 221/158

[51] **Int. Cl.** **B65g 53/04,** B23q 7/12

[58] **Field of Search** ..... 221/157, 158, 159, 160; 198/33 AD, 268, 273, 274, 278, 279, 285; 302/29, 31

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[57] **ABSTRACT**

An orienting apparatus for cap-shaped members which have flanges extending from opposite sides thereof in substantially coplanar relationship. The cap-shaped members are disposed randomly on a suitable feed means in the course of an assembly operation and are suitably guided to a separator means where separation is effected on the basis of the random position of the flanges. Thereafter, if desired, the cap-shaped members may be recombined into a unidirectional flow path. In a preferred embodiment, the feed means constitutes an air conveyor with associated plenum chamber means. Thus the feed means utilizes no moving parts which might damage or bend the cap-shaped members and can handle them at sufficiently rapid speeds to maintain a pace with production equipment.

9 Claims, 5 Drawing Figures

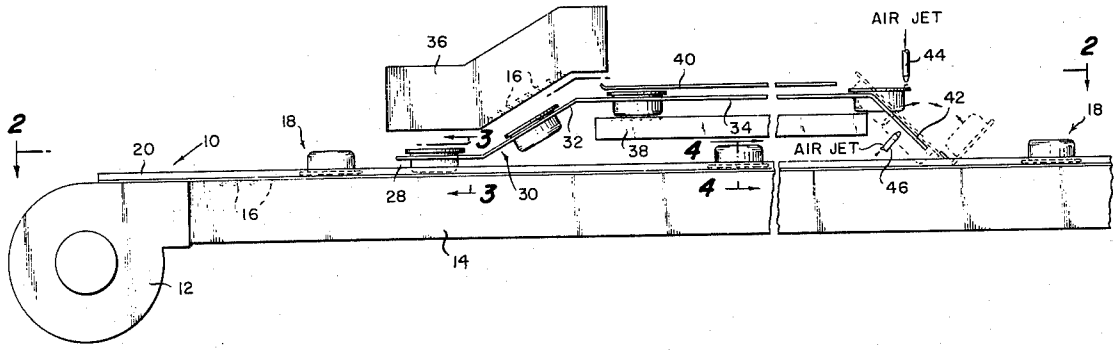


Fig. 1

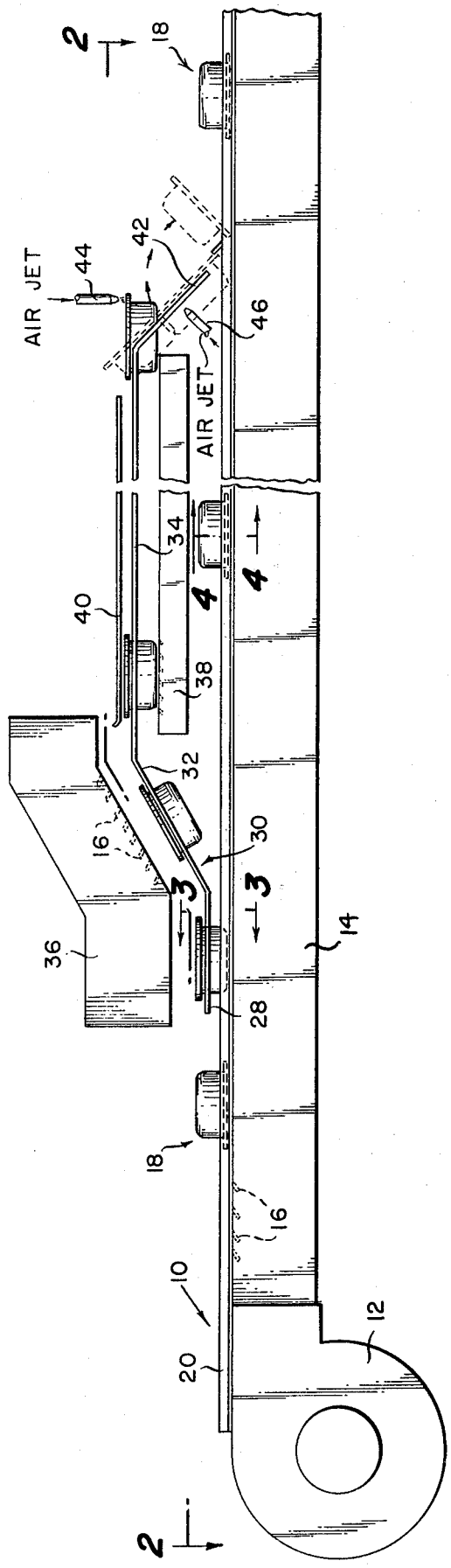
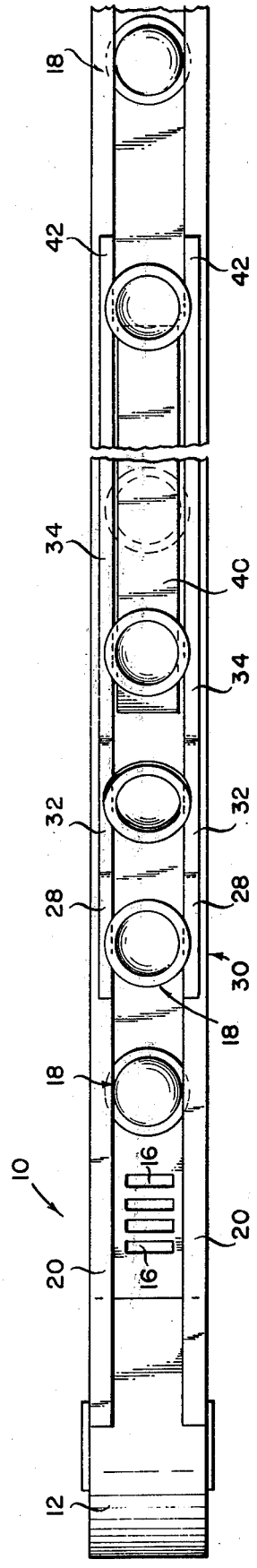

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18
AIR JET
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42
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AIR JET
34
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36
14
28
18
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12
2

Fig. 2


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20
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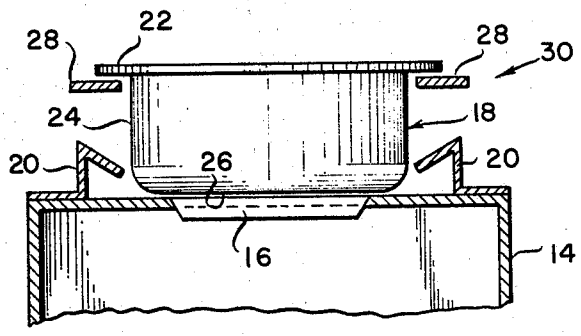


Fig. 3

Fig. 4

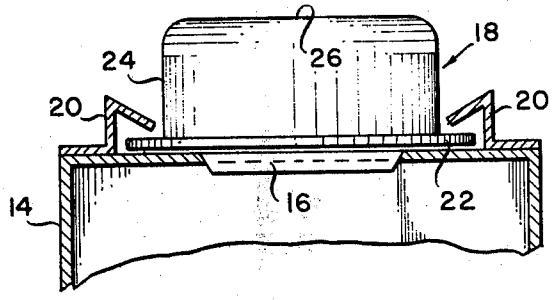
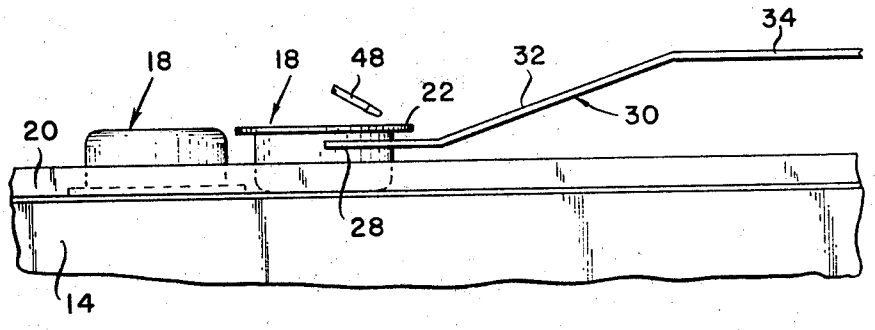


Fig. 5



ORIENTING APPARATUS FOR CAP-SHAPED MEMBERS

This invention relates to an orienting apparatus for cap-shaped members and, more particularly, to such members having laterally extending, substantially coplanar flange means which facilitates the rapid handling thereof in the course of their assembly with other components.

The articles with which the present invention is concerned are typified by a cap-shaped or cup-like member with a laterally extending brim or flange portion such as is found on a metallic valve cup or like closure member for aerosol spray containers. Difficulty has been experienced in handling these closure members in that the delivery of these articles from a typical blanking press is random in nature. The cap or hat-shaped members customarily assume one of two stable conditions, that is, one in which the article rests on the brim or flange portion or one in which it rests on the top of the cap or hat.

It is necessary to arrange the cap members in a consistent orientation prior to introduction of the cap members to the next machine operation. The preferred consistent orientation according to the present invention is with each cap member resting on its brim or flange portion.

The present invention provides an effective apparatus for achieving the desired orientation of the cap-shaped members and for handling them at sufficiently rapid rates to maintain a pace with the production equipment. Specifically, the apparatus of the present invention includes feed means for feeding the cap-shaped members in a given direction with the members being in one of two stable conditions, first side guide means for limiting lateral movement of the cap-shaped members as they move in the conveyed direction and means engageable with the flange means of all of the cap-shaped members partaking of one of the two positions in order to separate the members in that position from those in stable condition in the other position. In a preferred embodiment of the present invention the means engageable with the flange means constitutes a fixed cam member which also constitutes a second side guide means for the cap-shaped members in one of two provided for flow paths following separation. Also in a preferred form of the present invention the feed means utilizes no moving parts and constitutes an air lift conveyor provided with plenum chamber means.

The inherent advantages and improvements of the present invention will become more readily apparent upon considering the following detailed description of the invention and by reference to the accompanying drawings in which:

FIG. **1** is a side elevational view, schematic in nature, illustrating one embodiment of the apparatus of the present invention;

FIG. **2** is a top plan view of the apparatus of FIG. **1**;

FIG. **3** is an elevational view taken in vertical cross section along line **3—3** of FIG. **1**;

FIG. **4** is an elevational view taken in vertical cross section along line **4—4** of FIG. **1**; and,

FIG. **5** is an elevational view, fragmentary in nature, illustrating another embodiment of the present invention.

Referring now to FIGS. **1** and **2** of the drawings, there is illustrated generally at **10** an air lift conveyor means which constitutes feed means for the articles to be handled herein. The air lift conveyor means **10** is provided with a suitable fan or blower member **12** and is connected to one or more plenum chamber means **14** in a conventional manner.

The plenum chamber means **14** is preferably angularly slotted along its top wall at **16,** as seen best in FIGS. **3** and **4,** in order to impart both a lifting and a forward movement to the articles being conveyed, with the articles being designated generally at **18.** Although the slots **16** are provided at regularly spaced intervals throughout the length of each plenum chamber, only a few of the slots are shown for the convenience of illustration. The articles **18** are restrained and contained in their lateral movement by a pair of side guide members **20** which are so arranged as to have inwardly directed edge portions which overlie a flange or brim portion **22** of the cap-shaped members **18** as seen in FIG. **4.** Alternatively, when the cap-shaped members **18** are in their other stable position, as illustrated in FIG. **3,** the edge portions of side guide members **20** lie beneath the flange or brim portion **22.** The cap-shaped members **18** have a side wall **24** and a top wall **26** with the top wall either being on the bottom as seen in FIG. **3** or on the top as seen in FIG. **4.**

With air being supplied from fan or blower member **12** through slots **16** and with the articles being restrained within the pair of side guide members **20,** the articles are advanced from left to right in FIGS. **1** and **2** until the flange portion **22** comes into proximity with a fixed cam-leading edge section **28** of a separating means indicated generally at **30.** The separator means **30** has an upwardly inclined ramp section **32** followed by a level section **34** whereby the cap-shaped articles **18** which are being conveyed in the brim-up stable position illustrated in FIG. **3** will contact the separator means **30** and be elevated with the aid of an auxiliary overhead slotted plenum chamber **36** as seen in FIG. **1** up the ramp section **32** and thereafter along level section **34.** In order to advance the separated cap-shaped members **18** along the level section **34** a further auxiliary plenum chamber **38** is employed together with an optional top guide **40** to enable the cap-shaped members **18** to be directed into position to come under the influence of the further handling means **42, 44.**

The separated and elevated cap-shaped members **18** continue along the level section **34** of predetermined length, as indicated by the broken view lines in FIGS. **1** and **2,** whereupon the separated cap-shaped members **18** may be brought back into unidirectional flow with the brim-down cap-shaped members **18** which were not separated by the separator means **30.** For this purpose, section **34** merges into a downwardly sloping portion **42** and suitably controlled first air jet means **44** and second air jet means **46** for redirecting the cap-shaped articles and effecting a 180° turnover. The first and second air jet means **44** and **46** are indicated only schematically as one manner in which the cap-shaped members may be flipped over. Any other suitable means may be used to do this and may include a positive guide cam track which effects a 180° turnover for the cap-shaped articles **18.** Means of this latter type is used extensively in conveying cylindrical articles such as metal cans, for example.

Referring now to FIG. **5,** there is illustrated another embodiment of the invention wherein an air jet means **48** is used to replace the overhead plenum chamber **36**

illustrated in FIG. 1 in order to propel the cap-shaped members **18** up the upwardly inclined section **32** before they reach the level section **34.** It is to be understood that a suitable air supply which may include the already designated fan or blower member **12** is connected to each of the plenum chamber means **36** and **38** in FIG. **1** as well as to the air jet means **44** and **46** in FIG. **1** and **48** in FIG. **5.**

It will be appreciated that with the air lift conveyor means **10,** the cap-shaped articles **18** are advanced with feed means which utilizes no moving parts and which preferably comprises an air lift conveyor with associated plenum chamber means.

For a more detailed disclosure of the air conveyor means per se, reference is made to the co-pending application entitled "Air Conveyor" identified by Ser. No. 215,882 filed Jan. 6, 1973 and owned by a common assignee.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by U.S. Letters Patents is:

1. An air conveyor for conveying and orienting cap-shaped members having an end flange which extends from opposite sides of said members in substantially coplanar relationship, said air conveyor comprising:

a. a plenum chamber and a horizontally extending perforated deck plate for issuing air jets from said plenum to convey said cap-shaped members longitudinally in a given direction along a first path on said plate,

1. said air conveyor including at least one section wherein said cap-shaped members are randomly oriented with some of said cap-shaped members having their flanges in a first upper position and others of said cap-shaped members having their flanges in a second downward position,

b. first side guide means for limiting lateral movement of said cap-shaped members as they move longitudinally in said given direction,

c. and separator means defining a second horizontally extending path engageable with said flanges of all of said cap-shaped members having said first of said two positions for separating these cap-shaped members to flow along said second path and those members having their flanges in the second of said two positions moving along said first path,

d. second air jet means to move said cap-shaped members along said second path on said separator means,

e. said second path having a terminal portion in converging relation with the first path,

f. and means for inverting said caps flowing through said terminal portion and for delivering the caps to the first path.

2. An orienting apparatus as defined in claim **1** wherein said means engageable with said flange means constitutes a fixed cam member.

3. An orienting apparatus according to claim **1** wherein said means engageable with said flange means also includes means for elevating the cap-shaped members engaged thereby.

4. An air conveyor as defined in claim **1** in which said separator means defining said second path includes an entrance section for engaging cap-shaped members in said first position, an upwardly inclined ramp section contiguous with the entrance section, a level section contiguous with the ramp section, and a downwardly sloping portion contiguous with the level section defining the terminal portion of the second path.

5. An air conveyor as defined in claim **4** in which said second air jet means includes means for issuing air jets to move said cap-shaped members up said ramp section.

6. An air conveyor as defined in claim **4** in which said second air jet means includes means for issuing air jets to move said cap-shaped members along said level section.

7. An air conveyor as defined in claim **4** in which said inverting means is an air jet adjacent said terminal portion of said second path.

8. An air conveyor as defined in claim **4** in which said second air jet means includes a plenum chamber and perforated deck plate extending along said ramp section, and a plenum chamber and a perforated deck plate extending along said level section each for issuing air jets to move the cap-shaped members along the second path.

9. An air conveyor as defined in claim **1** in which said separator means comprises a pair of spaced rail members for engaging the flange portion of said cap-shaped members.

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