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[54] **SELF-ADJUSTING CODING APPARATUS**

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[52] **U.S. Cl.** **101/35,** 101/376

[51] **Int. Cl.** **B41f 17/16**

[58] **Field of Search** 101/35, 376, 120, 101/178, 170, 152–157, 375; 118/262

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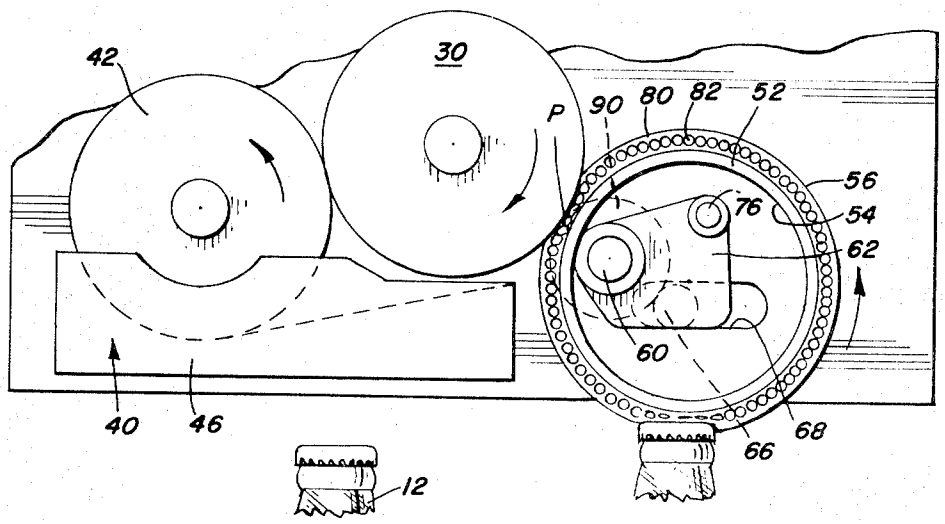
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[57] **ABSTRACT**

Marking apparatus for applying indicia to capped bottles or other containers of varying heights. The device consists of a rim having a print ring on the outer perpheral surface held in frictional engagement with a drive wheel that also performs a function of supplying ink to the print ring and is maintained in frictional engagement through a smaller diameter wheel engaging the inner surface of the rim. A substantial point contact between the inner surface of the rim and the outer surface of the support wheel allows the rim to move vertically to compensate for bottles of varying heights passing under the rim. While not necessary to the practice of the invention, an idler roller may engage the inner surface of the rim at the location spaced from the contact with the second wheel to provide additional support for the rim during its normal rotational movement.

10 Claims, 3 Drawing Figures



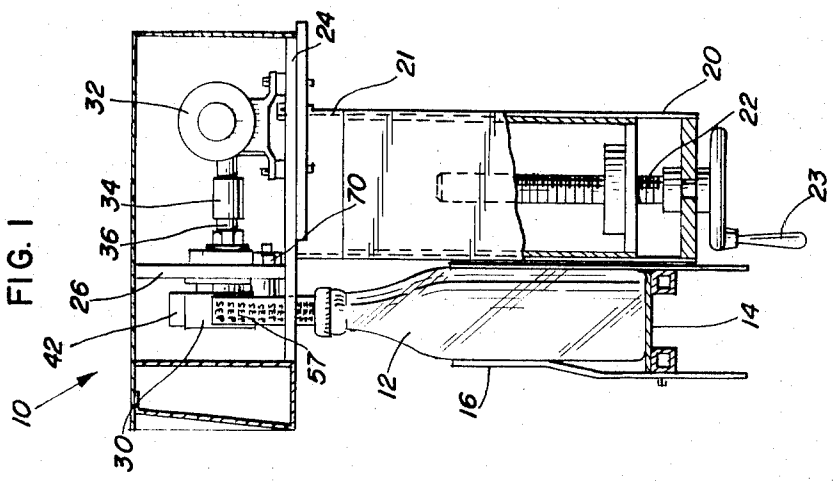


FIG. 1

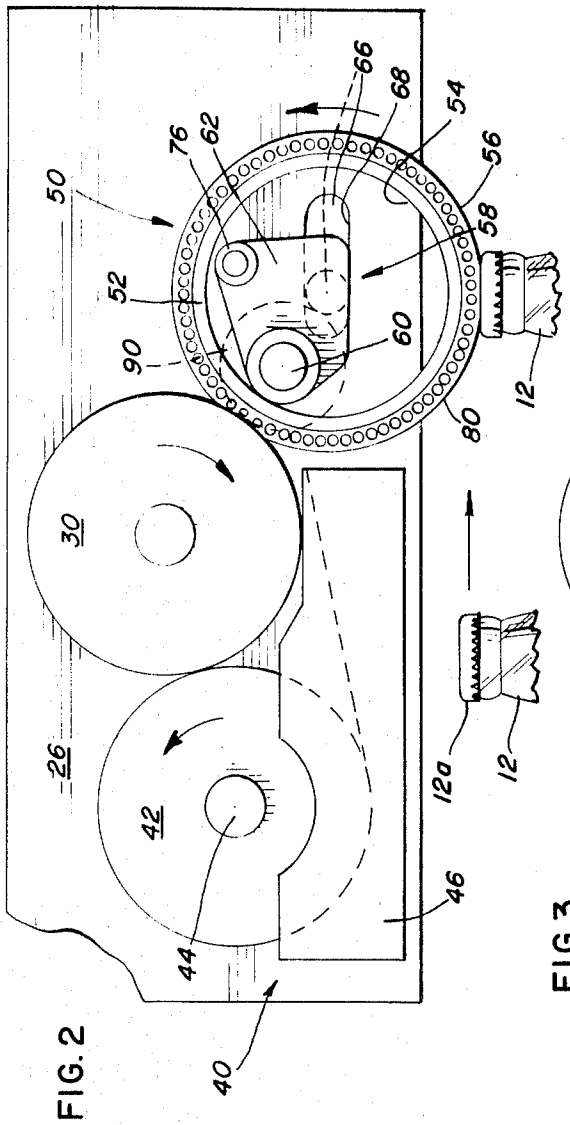


FIG. 2

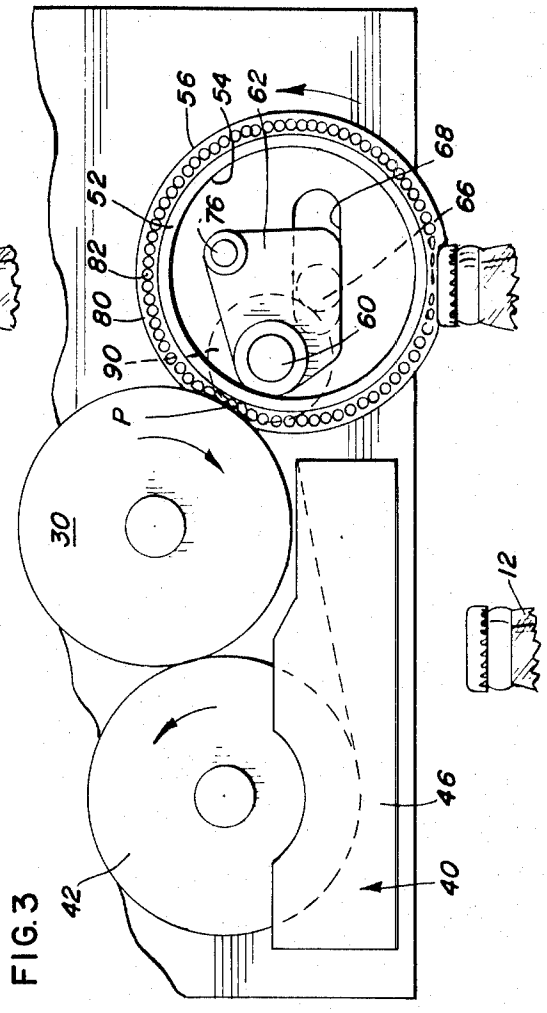


FIG. 3

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SELF-ADJUSTING CODING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates generally to coding apparatus and more particularly to an improved mechanism for compensating for variations in height of containers being marked.

One of the major problems in coding any kind of bottles or other containers is the variations in height of the bottles. This is particularly accute in foreign countries where it has been found that this variation in height between purportedly the same size bottles can be in excess of one-fourth of an inch. The ability to compensate for these variations in height without affecting the character of the indicia being applied to the bottle caps has been one of the major problemS in coding apparatus.

Coding apparatus of this general type normally includes a first wheel that is driven by a suitable source, such as an electric motor, and a printing wheel that is frictionally driven by first wheel with suitable mechanism for supplying ink to the printed wheel.

One manner of adjusting for bottle height variations is to support the print wheel for pivotal movement about the center of the drive wheel. This allows the print wheel to move up and down about the periphery of the drive wheel as the bottles to be coded are passing along a path below the two wheels. However, because of the fairly large mass of the print wheel as well as its supporting structure, relatively high inertia forces are developed as the print wheel moves up and down resulting in uneven pressure between the containers and the wheel. This causes a smearing of the indicia as it is being applied to the upper surface of the container and detracts from the quality of the print. In order to partially overcome this problem, some sort of spring dampening means is usually incorporated into the pivoted printing wheel which further increases the mass resulting in further uneveness of the pressure of the print wheel onto the surface of the container.

SUMMARY OF THE INVENTION

The coding apparatus of the present invention incorporates a self-adjusting feature which automatically compensates for variations in height of containers that are being marked on the upper surface thereof while still applying a substantially constant pressure between the printing ring and the top surface of the containers.

According to the present invention, the transfer means for receiving ink from a supply and delivering the ink in the form of indicia to the top of containers consists of a circular rim having an inner and outer surface with indicia means on the outer surface and frictionally engaging a driven wheel and contact means engaging the inner surface to maintain the indicia means in engagement with the periphery of the driven wheel. The rim and contact means cooperates to allow vertical movement of the bottom edge of the rim and accommodate containers of varying heights.

In the illustrated embodiment, the marking apparatus includes a wheel that is driven by a suitable source, such as a motor, and has its peripheral surface in engagement with a freely rotatable inking roll that cooperates with an ink well to deliver ink to the periphery of the driven roll. The ink is then transferred from the driven wheel onto the periphery of the transfer rim and ultimately onto the top surface of caps closing containers.

The contact means is in the form of a wheel that is freely rotatable on a support plate and the wheel is adjustable relative to a fixed support to vary the spacing between the peripheral surface of the two wheels to approximately the thickness of the rim. In addition, to provide further support for the printing rim, an idler roller is also supported for rotation about a fixed axis on the support plate at a location spaced from the axis for the contact wheel. The diameters of the contact wheel and the idler roller are considerably less than the diameter of the inner surface of the rim and are positioned so as to engage the inner surface of the rim at circumferentially spaced locations, both of which are located above the center of the rim. With this arrangement, substantial line contact is developed between the inner surface of the rim and the outer surface of the contact wheel to allow the rim to pivot about an axis that is aligned with the axis for the contact wheel and the driven wheel and is at a location substantially centrally located between the spaced peripheral surfaces of the two wheels.

To further accommodate bottles of varying heights, the print ring is preferably of the compressible type and, for this purpose, is molded with holes therein so that the compressibility of the ring will accommodate some variation in height of bottles.

In some instances, it may also be desirable to positively drive the contact wheel when heavy resin-type inks are used. According to a further aspect of the invention, this is accomplished by providing a radially extending flange from the contact wheel and having its peripheral surface in frictional engagement with the driven wheel so that the contact wheel rotates in response to the rotation of the driven wheel.

The present arrangement allows for automatic adjustment of the printing rim to accommodate bottles of varying heights proceeding along a path. The relatively small mass of the print rim can readily be moved vertically and will do so without significantly varying the pressure against the article being printed.

According to a further aspect of the invention, the contact wheel and idler roller are adjustably supported on the support member to vary the amount of pressure between the print rim and the driven wheel.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF DRAWINGS

FIG. 1 is an end view, partly in section, of a container conveyor having the self-adjusting coding apparatus supported adjacent thereto;

FIG. 2 is a side elevation of the coding apparatus shown in FIG. 1 with the cover removed; and

FIG. 3 is a view similar to FIG. 2 showing the printing mechanism in the self-adjusted position.

DETAILED DESCRIPTION

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail one specific embodiment, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated.

FIG. 1 of the drawings discloses the coding apparatus **10** constructed in accordance with the present invention and supported adjacent a path of an advancing procession of containers **12**. The path for the containers is defined by a conveyor **14** that may be of any suitable type with supporting structure **16** adjacent the path to restrict the containers, which are illustrated as capped bottles. The basic structure of the coding apparatus **10** is generally of the type disclosed and claimed in my co-pending application Ser. No. 776,114, filed Nov. 15, 1968, now U.S. Pat. No. 3,589,280. While not specifically limited to any specific type of coding apparatus, the present invention will be described in connection with the coding apparatus generally disclosed in the co-pending application.

The coding or marking apparatus for printing indicia on the top surface of the advancing procession of containers moving along a path consists of a support having a first piece **20** fixedly secured adjacent the path for the bottles **12** and a second piece **21** that is vertically adjustable relative to the first piece through an adjustment screw **22** and a crank member **23**.

The support means further includes a horizontal plate **24** that is fixedly secured to the upper end of the second piece **21** and an additional vertical plate **26** that extends above the horizontal plate **24**. The vertical plate **26** or support member is located above the path for the bottles **12** and has a drive wheel **30** supported for rotation on a fixed axis. The drive wheel is rotated by drive means **32** that is illustrated an electric motor having its output shaft connected through a coupling **34** to a shaft **36** that forms part of the wheel **30**.

The marking apparatus **10** further includes ink supply means **40** for maintaining a supply of ink on the periphery of the drive wheel **30**. In the illustrated embodiment, the ink supply means consists of an inking wheel or roller **42** supported by a stub shaft **44** on the plate **26** with the periphery of the wheel **42** being in frictional engagement with the periphery of the drive wheel **30**. An ink well **46** is secured to the plate **26** and positioned such that the lower portion of the ink wheel **42** is located within the inking well. With this arrangement, rotation of the drive wheel **30** will cause simultaneous rotation of the inking wheel **42** to transfer ink from the well **46** to the periphery of the drive wheel.

The coding apparatus **10** further includes transfer means **50** for receiving ink from the drive wheel **30** and delivering the ink to the tops of the containers **12** as the containers or bottles are moved along the path. According to the invention, the transfer means **50** is automatically capable of compensating for variation in height of bottles advancing along the path while still producing a clear print on the top surface of the bottle caps.

In order to accomplish this in a simple and inexpensive manner, the transfer means includes a circular rim **52** having an inner surface **54** and an outer surface **56**. The outer surface has indicia **57** (FIG. 1) thereon while contact means **58** engage the inner surface of the rim and maintain the indicia means in engagement with the periphery of the drive wheel **30**. According to the primary aspect of the present invention, the contact means and rim cooperate to accommodate vertical movement of the bottom of the rim **52** and allow containers of varying heights to pass along the path and have each of the containers receive an imprint of the indicia means on the periphery of the rim.

Most specifically, the contact means **58** is in the form of a second wheel or roller **60** that is carried by a support plate **62** which in turn is supported on the vertical plate **26**. The support plate or means **62** is positioned on the plate **26** in a manner to locate the periphery of the second wheel **60** in spaced relation to the periphery of the drive wheel **30** with the rim **52** being located between the two wheels and having its outer surface **56** in driving engagement with the periphery of the drive wheel and its inner surface **54** engaging the peripheral surface of the second wheel **60**. An inspection of FIG. **2** and **3** shows that the diameter of the second wheel **60** is considerably less than the diameter of the inner surface **54** of the rim **52**. This results in substantial line contact between the inner surface **54** of the rim **52** and the peripheral surface of the wheel **60** for a purpose which will be described later.

According to another aspect of the invention, the support means **62** can be adjusted relatively to the support **26** to vary the amount of pressure developed between the periphery of the rim **52** and the periphery of the drive wheel **30**. This is accomplished by supporting the plate **62** on the plate **26** through a stub shaft **66** that extends through an elongated slot **68** in the plate **26**. The stub shaft **66** is secured in any one of a plurality of adjusted positions by a nut **70** threaded on the end of the stub shaft. Thus, by loosening the nut **70**, the shaft **66** can be shifted horizontally in the slot **68** to vary the spacing between the periphery of the wheels **30** and **60**.

In its preferred embodiment, the transfer means further includes second contact means engaging the inner surface **54** of the rim at a location spaced from the contact point for the wheel or roller **60**. The second contact means is in the form of an idler roller **76** that is supported for rotation about a fixed axis on the plate **62** and has a diameter substantially less than the diameter of the inner surface **54**. This results in substantial line contact between the surface of the roller **76** and the inner surface of the rim at a location that is spaced from the contact between the wheel **60** and the inner surface of the rim.

With the described arrangement, the rim **52** is normally held in the position shown in FIG. **2** where rotation of the drive wheel **30** will frictionally drive the rim **52** and transfer ink from the periphery of the wheel **30** onto the top surface of the bottle cap **12***a*.

In positioning the coding apparatus for a coding application of a plurality of containers **12** moving along the path, the plate **24** is first positioned vertically so as to locate the outer surface of the rim **52** in vertical alignment with the shortest bottle that will be passing along the path defined by the conveyor **14**. The procession of containers **12** is then initiated and the motor **32** is energized and the speed is adjusted to have the angular velocity of the outer surface of the rim **56** correspond to the linear velocity of the top surfaces of the caps **12***a*. Thus, as the bottles pass below the rim **52**, indicia is applied to the top surface of the caps **12***a*. However, assuming that one of the bottles is of a greater height than the vertical spacing between the lowest edge of the rim and the top of the conveyor, the transfer means will automatically adjust to this height

when the higher bottles pass under the lower edge of the rim. This arrangement is illustrated in FIG. 3 where it will be seen that the rim **52** is pivoted about a point P located in a plane that extends through the axes of the wheels **30** and **60** and the inner surface of the rim is moved away from the peripheral surface of the idler roll **76**. More specifically, the pivot point for the rim **52** is located an equal dimension from the periphery of the respective wheels **30** and **60** and the wheels **30** and **60** engage the rim **50** at a location circumferentially spaced from the area of contact between the peripheral surface of the printing rim and the containers moving along the path.

Immediately after the higher bottle has moved past the rim **56**, the rim will automatically return to its supported position shown in FIG. **2**. Because of the relatively small mass of the very thin rim **52**, the rim can easily return to an equilibrium position shown in FIG. **2** before the next succeeding bottle **12** is passed under the rim. This arrangement is important since it insures that the quality of the print on each of the caps **12***a* is of the same high quality character.

According to another aspect of the invention, the outer surface **56** of the rim is defined on a resilient compressible portion or ring **80** that is capable of being compressed a predetermined dimension. In the illustrated embodiment, the resilient ring or portion **80** is in the form of a compressible ring of rubber or other suitable material that has a plurality of small openings **82** defined therein. The openings **82** and the resiliency of the rubber allows a predetermined amount of compression that will perform two distinct functions. First, the compressibility of the ring or outer portion of the rim **52** will automatically compensate for small variation in bottle height. Thus, with only small variations in bottle heights, the rim **52** need not be moved from its position shown in FIG. **2**. However, should the bottle height be of sufficient magnitude to be greater than the compressibility of the ring **80**, the rim will then be moved vertically as is shown in FIG. **3**. The compressible ring or portion **80** performs a second function of allowing for variations in the amount of pressure that is developed between the outer surface of the rim and the peripheral surface of the drive wheel **30**. As is seen in FIG. **2**, in the adjusted position shown, the second wheel **60** is spaced from the first wheel **30** by a dimension that is less than the radial dimension of the rim **52** including the ring portion **80** in its undeformed condition. This causes the ring **80** to be partially compressed in the area between the periphery of the wheels **30** and **60** and increases the pressure developed between the outer surface **56** of the rim and the outer surface of the wheel **30**. Thus, it may be stated that the driving force between the periphery of the rim and the drive wheel may be varied by adjusting the position of the second wheel **60**.

In some instances, it may also be desirable to provide a further driving force to the rim **52** in, for example, instances where heavy resin type inks are used which are fairly good lubricants and will result in reduced frictional contact between the periphery of the rim **52** and the periphery of the wheel **30**. This can simply and effectively be accomplished by providing a radial flange **90** extending from the periphery of the wheel **60** that frictionally engage the periphery of the drive wheel so as to positively drive the wheel **60** in response to rotation of the drive wheel **30**. The flange means would extend along one edge of the rim **52** and would engage the periphery of the drive wheel **30** beyond the point of contact for the print rim **52**. It would be appreciated that in this instance, it would be desirable to have the axial dimension of the ink transfer wheel **42** be substantially equal to the axial dimension of the rim **52** while the drive wheel **30** would have a greater axial dimension to produce an uninked portion that would be contacted by the flange **90**.

Various well known ways could be utilized to increase the frictional engagement between the outer periphery of the radially extending flange **90** and the periphery of the wheel **30**. It would also be appreciated that two such flanges **90** could be utilized and could be located on opposite sides of the rim.

It will be appreciated that the amount of vertical movement of the lower edge of the outer surface of rim **52** will be dependent upon the amount of compression of the rim **52** and the wheel **30** as well as the diameter of the second or driven wheel **60**. Also, the contact between the support means for the rim **52** and the contact means occurs above the center of the rim thus allowing for the rim to be moved vertically about the pivot point with a minimum amount of force, approximately the amount required to move the weight of the rim.

The mechanism of the present invention provides a simple and automatic expedient of compensating for varying heights of bottles while utilizing a minimum amount of material, all of which is readily available in its original form.

What is claimed is:

1. Marking apparatus for printing indicia on the top surface of an advancing procession of containers moving along a path comprising: a support member located above said path; a drive wheel supported on a fixed axis on said support member; drive means for rotating said wheel; a second wheel; support means on said support member for locating the periphery of said second wheel in spaced relation to the periphery of said drive wheel; a printing rim having an outer surface in driving engagement with the peripheral surface of said drive wheel and an inner surface engaging the peripheral surface of said second wheel, said inner surface having a diameter greater than the diameter of said second wheel and said wheels being circumferentially spaced from the area of contact between the peripheral surface of the printing rim and the containers moving along the path to allow vertical movement of said rim and accommodate containers of varying height advancing along said path.

2. Marking apparatus as defined in claim **1**, further including a roller carrried by said support means, said roller having a peripheral surface normally engaging the inner surface of said rim, said roller having a diameter substantially less than the diameter of said inner surface.

3. Marking apparatus as defined in claim **1**, further including adjustment means between said support member and said support means for varying the spacing between said wheels.

4. Marking apparatus as defined in claim **1**, further including flange means extending from the periphery of

said second wheel and frictionally engaging the periphery of said drive wheel for driving said second wheel in response to rotation of said drive wheel.

5. Marking apparatus as defined in claim 1, in which said rim has a resilient compressible portion adjacent the peripheral surface of said second wheel.

6. Marking apparatus for applying indicia to tops of containers supported for movement along a path comprising a support adjacent said path; a drive wheel rotated about a fixed axis on said support above said path; ink supply means for maintaining a supply of ink on the periphery of said wheel; and transfer means for receiving ink from said wheel and delivering said ink to the tops of the containers, the improvement of said transfer means including a circular rim having an inner and outer surface; indicia means on said outer surface; and contact means engaging said inner surface and maintaining said indicia means in engagement with the periphery of said wheel, said contact means and rim cooperating at a location circumferentially spaced from the point of contact between the outer surface of said rim and the containers moving along the path to allow vertical movement of the bottom of said rim to accommodate containers of varying heights.

7. Marking apparatus as defined in claim 6, in which said contact means includes a second wheel having a diameter substantially less than the diameter of said inner surface.

8. Marking apparatus as defined in claim 7, further including a support plate supporting said second wheel for rotation about a fixed axis, and adjustable means between said support and support plate for varying the spacing between said wheels.

9. Marking apparatus as defined in claim 8, further including an idler support for rotation about an axis on said plate that is spaced from the axis for said second wheel, said second wheel and roller engaging the inner surface of said rim at circumferentially spaced locations.

10. Marking apparatus as defined in claim 9, in which said rim has an outer compressible portion with said indicia means on the outer surface thereof.

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