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SHELF ASSEMBLY FOR SUPPORTING AND FEEDING BOTTLES TO POINT OF DELIVERY IN VENDING MACHINES

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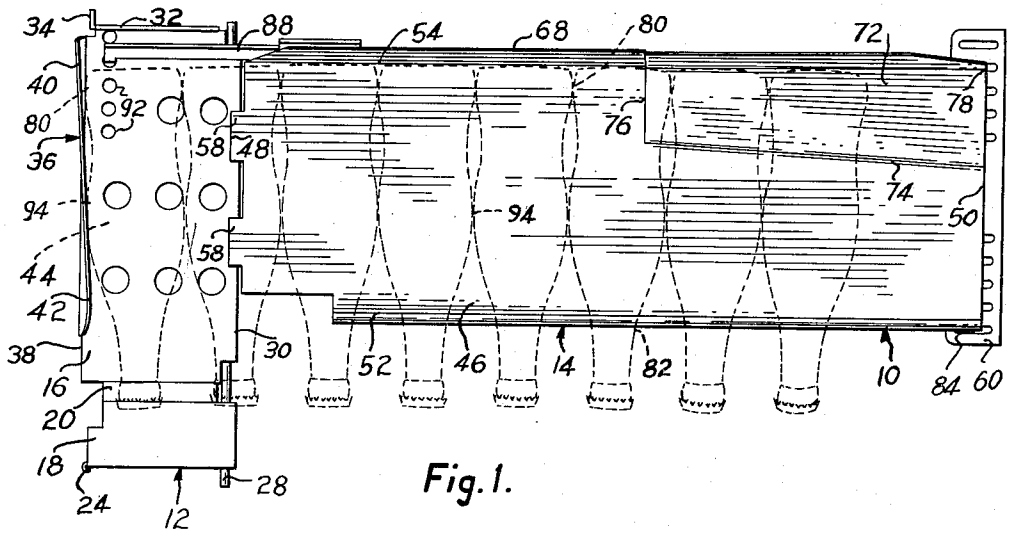


Fig. 1.

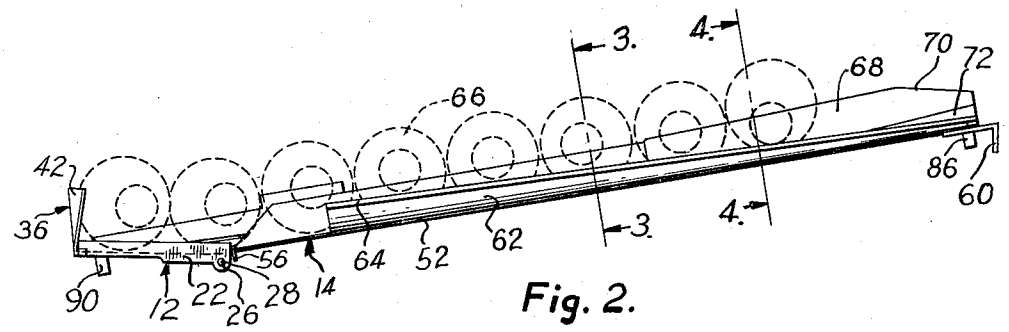


Fig. 2.

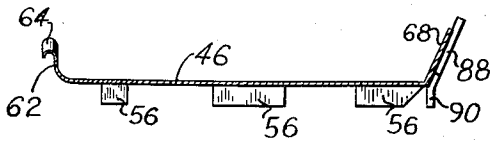


Fig. 3.

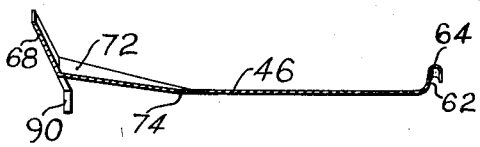


Fig. 4.

INVENTOR.
William C. Roehl
BY
ATTORNEY

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SHELF ASSEMBLY FOR SUPPORTING AND FEEDING BOTTLES TO POINT OF DELIVERY IN VENDING MACHINES

William C. Roehl, Kansas City, Mo., assignor to The Vendo Company, Kansas City, Mo., a corporation of Missouri

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This invention relates to improvements in vending machines and particularly, to equipment of the type permitting articles to be singly removed from the cabinet of the machine upon insertion of a coin.

It is conventional in machines of the kind referred to above to provide a plurality of superimposed shelves within the storage compartment of the vending machine cabinet for receiving the vendable merchandise and from which the latter are discharged one by one to the customer. An example of a vending machine particularly adapted to handle bottled beverages is illustrated in U.S. Patent No. 2,766,906 and incorporated herein by reference, wherein it can be seen that mechanism is provided for permitting the removal of a single bottle from any one of a number of shelves upon insertion of the proper coins into the machine but preventing the customer from removing additional bottles during a single cycle of operation. In machines of this character, the superimposed shelves are normally inclined to cause the bottles supported thereby to gravitate toward respective vending stations normally blocked by movable captive mechanism, but problems have arisen by virtue of the tendency of the bottles disposed on the inclined shelves to shingle and thereby become jammed after a bottle has been removed during one vend cycle, and thus precluding gravitation of another bottle into a vending position. Various attempts to prevent shingling of the bottles have not, for the most part, been successful in the absence of utilizing spring biased mechanism in the nature of a follower or the like. One satisfactory solution is disclosed in U.S. Patent No. 2,750,049 but it can be seen that the spring biased follower disposed to engage the uppermost bottle and thereby bias the row supported by the shelf thereof toward the vending station complicated the shelf construction, making the same more expensive and subject to breakdown, and more time was employed in filling of the machine by virtue of the fact that the slidable, spring-biased follower had to be manually reciprocated to the outermost end of its path of travel and then moved into interengagement with means for maintaining the follower at the outer end of the shelf until the shelf assembly had been completely filled with bottles.

It is, therefore, the most important object of this invention to provide a shelf assembly for utilization in a vending machine wherein a plurality of bottles are disposed in side-by-side relationship upon the shelf assembly and permitted to roll one by one into a vending station, with no mechanical or other means being required to force or feed the bottles onto the vending platform aligned with each shelf unit.

It is a further important object of the invention to provide a shelf assembly for vending machines wherein gravitational feed of the bottles along the inclined shelf is effected without shingling of such bottles by virtue of the provision of novel means for maintaining the row of bottles on each shelf in slightly fanned relationship, whereby sufficient clearance is provided for the bottles to permit the same to roll downwardly on respective shelves without jamming or clogging occasioned by movement of the bottles into position of excessive angularity.

Also an object of the invention is to provide an improved shelf unit as referred to above, wherein excessive

shingling of the bottles during gravitation of the same toward the vending station is precluded through employment of wall structure disposed to be engaged by the neck portions of the bottles and maintain the same at a proper elevation during gravitational movement of the bottles toward the vending station.

A still further important object of the invention is to provide a shelf assembly as defined above having inclined, anti-jamming means at the normally uppermost part of the shelf panel adapted to be engaged by the butt portions of those bottles initially located at the upper end of the shelf assembly to thereby cause such bottles to be tilted at a greater axial angle than the bottles at the lower part of the shelf and thus preventing jamming of the bottles on the shelf.

Other important objects of the invention relate to the provision of an improved bottle platform disposed at the vending station and aligned with the lower end of a respective shelf assembly, and including a member thereon adapted to be engaged by the bottle necks to be vended in a manner to contribute to the described fanning of the bottles on the shelf panel; to the provision of a shelf assembly wherein the main, normally inclined panel is adjustably and slidably joined to the vending platform to permit various sizes of bottles to be vended from the machine and without modification of the same; to the provision of an improved shelf assembly as described which may be substantially constructed from a single sheet of metal bent into suitable configuration, whereby the cost of the unit is materially decreased and assuring a long useful life of the assembly without maintenance of any kind being required; and to other important objects and details of construction of the instant shelf assembly which will become clear or be explained more fully as the following specification progresses.

In the drawing:

FIGURE 1 is a top plan view of a shelf assembly and associated platform for vending machines and including the novel features of the present invention permitting gravitational feed of the bottles to the platform without shingling of such bottles;

FIG. 2 is a front edge elevational view of the unit shown in FIG. 1; and

FIGS. 3 and 4 are vertical, cross-sectional views taken substantially on the lines 3—3 and 4—4 respectively of FIG. 2 and looking in the direction of the arrows.

As set forth above, the shelf and article platform unit broadly numerated **10** is particularly adapted for utilization in a vending machine as illustrated in U.S. Patent No. 2,766,906, although it is not intended that the use thereof be exclusive to a machine of this character. In any event, the vending machine cabinet normally houses a plurality of the platform and shelf units **10** in superimposed relationship, with a vending station being provided in alignment with each of the article platforms **12** directly aligned with the lower end of a respective shelf assembly **14**.

Platform **12** includes a main planar portion **16** adapted to be mounted within the vending machine cabinet in a substantially horizontal position with the forwardmost section **18** of platform **12** being integral with the forward extremity of planar portion **16** through an intermediate, inclined segment **20** interconnecting the same. Downwardly turned, forward flange **22** integral with the forwardmost extremity of section **18** has a hook **24** at one end thereof adapted to be releasably received by suitable supporting structure on the vending machine cabinet, while perforation **26** in the opposite end of flange **22** receives an elongated rod **28** of greater length than platform **12** and extending longitudinally of the same in relatively close parallel relationship to the longitudinal margin **30** of platform **12**. An upwardly turned flange

32 integral with the rearmost portion of planar portion 16 remote from flange 22 has a rearwardly extending hook 34, also adapted to be releasably connected to the supporting structure of the vending machine cabinet, while planar portion 16 includes means adjacent flange 32 below the lowermost surface of planar portion 16 rotatably receiving the rear extremity of rod 28.

An upwardly turned stop member 36 integral with the longitudinal margin 38 of planar portion 16 opposed to margin 30, is located in direct alignment with shelf assembly 14 and adjacent upwardly turned flange 32 at the rearmost portion of platform 12. As best shown in FIG. 1, stop member 36 is slightly spiral in longitudinal configuration with the rear and forward portions 40 and 42 respectively thereof being bent approximately 6½° in opposite directions from a vertical plane through the central portion of stop member 36, it being apparent that rear portion 40 is bent away from shelf assembly 14 while forward portion 42 is bent toward the same. It is to be understood, however, that rear and forward portions 40 and 42 respectively are transversely arcuate to permit the lowermost bottle 44 to substantially complementally engage the proximal curved surfaces of stop member 36.

Shelf assembly 14 also has a major planar portion 46 defined by opposed end edges 48 and 50 and opposed parallel, longitudinally extending side margins 52 and 54. Shelf assembly 14 is adapted to be mounted within the vending machine cabinet in an inclined position, with the end edge 48 thereof in substantial alignment with the major plane of platform 12 while end edge 50 is located above platform 12 a sufficient distance to cause planar portion 46 to be disposed at substantially 10° with respect to the horizontal. A number of spaced portions 56 of end 48 of planar portion 46 are turned downwardly to thereby prevent reciprocation of shelf assembly 14 past a vertical plane defined by downturned portions 56, while the remaining, outwardly projecting extensions 58 of end 48 presented by portions 56 are adapted to rest on the upper surface of planar portion 16 adjacent longitudinal margin 30 thereof. An L-shaped bracket such as indicated by the numeral 60 is preferably provided within the vending machine cabinet at a suitable elevation in order to support the end 50 of shelf assembly 14 remote from platform 12.

Planar portion 46 of shelf assembly 14 is provided with an integral, upwardly turned wall 62 joined to the forward margin 52 of planar portion 46 and extending substantially the entire length thereof. The uppermost longitudinal length of wall 62 is rebent upon itself to present a substantially U-shaped segment 64 presenting a transversely arcuate surface extending the entire length of wall 62. In order to provide the required support for a plurality of cylindrical articles in the nature of bottles 66 or the like, wall 62 is substantially longitudinally triangular with the distance between segment 64 and planar portion 46 gradually decreasing from adjacent end 48 of shelf assembly 14 toward end 50 thereof. For reasons to be hereinafter explained, segment 64 defining the upper margin of wall 62 preferably should be disposed at an angle of approximately 3° with respect to the major plane of planar portion 46 of shelf assembly 14, whereby marginal segment 64 is normally disposed at an angle of 7° with respect to the horizontal when shelf assembly 14 is mounted in proper position within the vending machine cabinet.

An upwardly turned flange 68 is also provided on shelf assembly 14, it being clear from FIG. 3 that flange 68 is integral with the longitudinally extending margin 54 of planar portion 46, and extends substantially the entire length of the panel defined by planar portion 46. Flange 68 is disposed at an angle of substantially 105° with respect to planar portion or panel 46 with the uppermost section 70 thereof being cut off to present a substantially horizontal edge to thereby permit shelf assembly 14 to be mounted in relatively close proximity to another shelf assembly disposed next thereabove.

A polygonal segment 72 of planar panel portion 46 of shelf assembly 14 and defined by intersecting, substantially rectilinear zones of juncture 74 and 76 between segment 72 and the major portion 46 of shelf assembly 14, is bent upwardly above the defined plane in a manner to cause the corner 78 of segment 72 to be disposed a substantial distance above the plane of panel portion 46. As clearly indicated in FIGS. 1 and 4, segment 72 not only slopes upwardly transversely of panel portion 46 but also longitudinally of the same. In order to produce the best results and permit gravitational delivery of bottles 66 to platform 12, it has been determined that the maximum slope of segment 72 transversely of panel portion 46 should be approximately 14° with respect to the horizontal, while the maximum inclination of segment 72 longitudinally of shelf assembly 14 should be approximately 7° with respect to the major plane of shelf assembly 14, whereby the maximum longitudinal angularity of segment 72 is approximately 17° when shelf assembly 14 is mounted in proper disposition within the cabinet. The upper marginal extremity of flange 68 directly opposed to segment 72 is parallel with the proximal marginal portion of segment 72 and thereby also disposed at an angle of approximately 17° with respect to the horizontal.

The width of panel portion 46 and segment 72 are correlated so as to receive bottles 66 in the manner best illustrated in FIG. 1, with the butt portions 80 of bottles 66 engaging angularly disposed flange 68, while the neck sections 82 of each bottle 66 are in direct overlying relationship to marginal segment 64 of wall 62 and in engagement with the same.

In order to permit shelf assembly 14 to be shifted horizontally within the cabinet, bracket 60 is provided with a plurality of parallel, longitudinally spaced slots 84 adapted to receive respective hooks 86 secured to the underface of panel portion 46 adjacent end 50 thereof. Also, a substantially L-shaped hook member 88 secured to the outer face of flange 68 adjacent end 48 of panel portion 46 has a downwardly projecting extension 90 adapted to be selectively disposed in any one of a number of equally spaced, parallel openings 92 in planar portion 16 of platform 12.

Although platform and shelf unit 10 may be utilized to vend various types of cylindrical articles such as bottles, the same has particular utility for storing and feeding bottles of the type illustrated in the drawing and which are irregular in longitudinal configuration with the butt portions 80 thereof being of slightly greater diameter than the central sections 94. It was found that when a flat panel was employed to store and feed a plurality of the irregularly shaped bottles 66, power operated feeding mechanism was required to force the bottles toward the vending station to preclude jamming of such bottles on the inclined support. It was found that bottles laid side-by-side on a shelf of uniform cross-section perpendicular to the length thereof tended to become progressively disorientated as they rolled toward the vend position, with the disorientation becoming so acute that the bottles were unable to move freely onto a platform such as 12 behind the bottle vending aperture. The tendency toward displacement of the longitudinal axes of the bottles from a reference line parallel to the axis of the vend opening, was found to be primarily attributable to the irregular surface configuration of the bottle and particularly the diminishing diameter of the neck portions of the bottles as compared to the butt sections of the same. The tendency of the bottles to shingle to such an extent as to preclude free rolling movement of the same downwardly toward the vending platform was increased by virtue of the butt ends 80 of bottles 66 contacting and hanging on the rear marginal flange of the shelf. Thus, even though inertia developed during

rolling of the bottles tended to cause the same to assume a normal transverse position on the inclined shelf, the combination of factors discussed above produced excessive shingling, thereby resulting in jamming of the bottles on the sloping support.

The instant platform and shelf unit permits gravitational feed of bottles **66** to platform **12** without jamming of such bottles by the combination of specific components described in detail above. For example, static average displacement of the axes of the bottles from the optimum is minimized by provision of extra clearance of the butt **80** of the lowermost bottle **44** when the same is positioned on planar portion **16** of platform **12**. It can be seen that the outwardly bent rear portion **40** of stop member **36** provides additional clearance for butt portion **80** of bottle **44** and also engages and properly supports the central section **94** of such bottle at the area of stop member **36** midway between the opposed ends of portions **40** and **42** respectively.

Furthermore, the inclined marginal segment **64** of wall **62** which is of less slope than panel portion **46** with respect to the horizontal, provides relatively constant opposition to excessive shingling of bottles **66** on shelf assembly **14**, since a component of the force moving bottles **66** down panel portion **46** acts substantially perpendicularly to the upwardly facing margin of segment **64**.

The inclination of segment **72** serves two important purposes, the first being to tilt the bottles **66** in engagement therewith forwardly so that the proximal portion of marginal segment **64** carries the neck portions **82** of such bottles **66** before the elevation of wall **62** is sufficient to otherwise contact such neck portions. Secondly, segment **72** tends to move the butt portions **80** of bottles **66** engaging the same, away from contact with rear flange **68** which tends to create excessive shingling of bottles **66** as described above. As the butt **80** of each bottle **66** moves off inclined segment **72**, the neck portions **82** thereof continue to rise and the effect is to pull the bottles **66** back in against rear flange **68** and in properly orientated positions for gravitation downwardly on panel portion **46**.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. In a vending machine provided with a bottle vending station, a unitary shelf assembly for supporting and feeding bottles to the station including an elongated panel having opposed ends and adapted to be mounted within the machine in an inclined position with one end thereof lower than the other end and aligned with said station, said panel being provided with flange structure disposed at one longitudinal margin of the panel and extending substantially the length of the panel, said structure being adapted to be engaged by the neck portion of the bottles in supporting relationship thereto as the latter roll down at least a portion of the panel and having less slope with respect to the horizontal than the normal inclination of the panel, and means on said panel including a segment forming a part of the panel and of greater slope with respect to the horizontal than the normal inclination of said panel, said segment being adapted to be engaged by the butt portions of the bottles for maintaining the latter in positions with the neck portions thereof engaging said structure as the bottles roll downwardly along said portion of the panel toward said station, the slope of the panel with respect to the horizontal being intermediate the inclinations of the structure and said segment to thereby substantially eliminate shingling of the bottles on said shelf assembly.

2. A shelf assembly as set forth in claim 1 wherein said segment extends from said other end of the panel to a point substantially midway of the ends of said structure.

3. A shelf assembly as set forth in claim 1 wherein said segment is inclined upwardly from the major plane of the panel transversely of the latter in a direction away from said structure.

4. A shelf assembly as set forth in claim 3 wherein said means includes an upwardly projecting flange portion at the outer margin of said segment, of substantially the same slope as said segment and disposed in a position adapted to engage the butt portions of said bottles as the latter roll down at least a part of the panel.

5. In a vending machine provided with a bottle vending station, a shelf assembly for supporting and feeding bottles to the station including an elongated panel having opposed ends and adapted to be mounted within the machine in an inclined position with one end thereof lower than the other end and aligned with said station, a substantially upright wall joined to and extending longitudinally of one longitudinal margin of the panel, said wall having an upper edge adapted to be engaged by the neck portions of the bottles in supporting relationship thereto as the latter roll down at least a portion of the panel, said panel having an integral segment adjacent said other end thereof and the longitudinal margin of the panel remote from said wall, said segment being elongated, adapted to receive the butt ends of the bottles adjacent said other end of the panel and inclined at a sufficient angle with respect to the panel transversely of the latter to maintain the bottles in positions with the necks thereof in engagement with said edge of the wall as the bottles roll downwardly along said portion of the panel toward said station and thereby precluding shingling of the bottles on said shelf assembly.

6. A shelf assembly as set forth in claim 5 wherein said segment is inclined longitudinally thereof with respect to the panel, and the normal slope of said edge of the wall is equal to approximately one-half of the longitudinal slope of said segment with respect to the horizontal.

7. A shelf assembly as set forth in claim 5 wherein the panel is adapted to be mounted in the machine at an angle of approximately 10° with respect to the horizontal, said edge of the wall having a normal slope of approximately 8° with respect to the horizontal.

8. A shelf assembly as set forth in claim 7 wherein said segment has a maximum slope longitudinally of the panel of approximately 17° with respect to the horizontal.

9. A shelf assembly as set forth in claim 5 wherein said segment slopes toward said wall transversely of the panel at a maximum angle of approximately 14° with respect to the major plane of the panel.

10. A shelf assembly as set forth in claim 9 wherein is provided a substantially upright flange joined to and extending along the longitudinal edge of the panel remote from said wall for engaging the butt ends of said bottles as the latter roll down at least a part of the panel.

11. A shelf assembly as set forth in claim 10 wherein said flange is disposed at an angle of approximately 105° with respect to the major upper face of said panel.

12. In a vending machine provided with a bottle vending station, a platform adapted to be mounted within the cabinet at said station and in a horizontal location, a shelf assembly for supporting and feeding bottles to the platform including an elongated panel having opposed ends and adapted to be mounted within the machine in an inclined position with one end thereof substantially aligned with one extremity of the platform and lower than the other end of the panel, said panel being provided with structure adapted to be engaged by the neck portion of the bottles in supporting relationship thereto as the latter roll down at least a portion of the panel, said structure having less slope with respect to the horizontal than the normal inclination of the panel, and means on said panel and adapted to be engaged by the butt portions of the bottles for maintaining the latter in positions with the neck portions thereof engaging said structure as the bottles roll downwardly along said portion of the panel toward said station and thereby precluding

shingling of the bottles on said shelf assembly said platform being provided with an upstanding member joined to the margin thereof in opposition to said panel, the normally rearmost portion of said member adapted to be engaged by the butt portions of the bottles being located in greater spaced relationship to the panel than the forwardmost portion of the member.

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