In a hydrostatic cooker, the carriers on the conveyor chain are in the form of pockets, mounted on one set of links which can be closed by gates mounted on adjacent links with abutments to prevent opening of the pockets in one direction of chain articulation and to accommodate opening of the pockets in the other direction of flexure for feed and discharge. Several embodiments are disclosed.
GATED CARRIER FOR HYDROSTATIC COOKER

FIELD OF THE INVENTION

This invention relates to the cooking or sterilizing of articles in containers and more particularly to an improvement in the conveyor carrying chain assembly such as that used in hydrostatic cookers.

REFERENCE TO RELATED APPLICATIONS

Copending United States application, Ser. No. 160,278, filed July 13, 1971, discloses abutment means on adjacent links of a hydrostatic cooker carrier chain for preventing articulation in one direction while accommodating articulation in the other direction in order to provide a smaller pitch chain than is normally employed. However, the carriers of this construction are not gated pocket members in accordance with the present invention.

DESCRIPTION OF THE PRIOR ART


SUMMARY OF THE INVENTION

The present invention relates to the improvement in the conveyor or carrier chain structure of the type that runs continuously through the hydrostatic and steam legs of the type of container processing, cooking and sterilizing equipment known as a hydrostatic cooker. Under the present invention, containers are fed into and discharged from the carriers at a single, small diameter feed and discharge sprocket assembly, and yet the containers are securely held in place as they approach these sprockets; against buoyancy in the water legs of the cooker and against the force of gravity in certain lower loops of the carrier conveyor passing through the cooker.

A feature of the improved carrier of the present invention is that it can be utilized for the processing of containers such as cylindrical cans lying on their sides, as well as for processing the so-called "squat" containers which are more stable when set on their bases instead of on their sides and which are relatively low in height. The containers are readily fed and discharged from the conveyor while supported on their flat surfaces and yet are positively confined at the various "critical" zones of the cooker. These critical zones are along the large lower loop section (which is usually a water cooled section) and wherein the cans tend to fall from the carriers by force of gravity; through the water legs including their lower loops wherein buoyancy tends to dislodge the cans from their carriers; and at the approach to the feed and discharge sprocket set.

Briefly, in accordance with the present invention the basic carrier chain of the present invention has a pitch one half that of a corresponding chain mounting conventional type carriers, such as that shown in the U.S. Pat. to Lee No. 3,286,619, Nov. 22, 1966. Pocket members having a bottom wall and at least one side wall are mounted on spaced chain links with the bottom of the pocket members facing out at the feed and discharge sprocket loop and with the bottoms facing up at the upper sprocket loops and at the smaller radius lower loops in the water legs. This means that the pocket bottoms face down at the larger radius lower return loop of the carrier chain.

Closure gate means are provided for each pocket, in a manner mounted so that articulation of the links in one direction (to a sufficient degree) opens the gates and articulation in the other direction closes the gates. In addition to this, abutments for holding the links against further articulation in the pocket closing direction are provided which, in effect, doubles the pitch of the chain. Among other places, the abutments act to lock up the chain, with the gates closed, at the portion of the conveyor which approaches the feed discharge sprocket assembly (when the pocket bottoms are up) as well as around the smaller radius lower loops at the bottom of the water legs, when the pocket bottoms are down. Closure in the latter zones prevents displacement of the cans due to buoyancy in the water. The abutments accommodate full opening of the links around the feed and discharge sprockets and although they also accommodate partial gate opening around the relatively large radius lower loop (when the bottoms are up), the latter loop has a radius large enough so that the gate opening articulation at this zone is not sufficient to drop out the containers.

In most forms of the invention the pocket members are in the form of cups having flat, opposed side walls and a bottom, and the flat side walls do not have turned lips, as in prior carriers. This facilitates feeding of squat cans into and out of the pockets. In a broader aspect of the invention, one of the side walls of each pocket can be mounted on a link adjacent to that which mounts the basic pocket.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram showing the path of a container conveyor of the present invention through a typical hydrostatic cooker, although in the broader aspect of the invention, the carrier could be used in paths other than that of FIG. 1.

FIG. 2 is an enlarged partial diagram like that of FIG. 1 showing a conveyor embodying pockets employed in one form of the invention.

FIG. 3 is an enlarged perspective showing constructional details of the pocket and gate member mountings.

FIG. 4 is an enlarged partial section of a carrier passing through a small diameter water leg loop.

FIG. 5 is a plan of FIG. 4, water omitted.

FIG. 6 is an enlarged detail of the conveyor passing around the feed and discharge sprocket.

FIG. 7 is a section showing the track guide construction.

FIG. 8 is an enlarged view showing the conveyor passing through the lower, large diameter return cooling leg of the hydrostatic cooker.

FIG. 9 is a horizontal section, of a modified form of the invention wherein the gate member is formed of abutting half gates straddling a pocket member.

FIG. 10 is an enlarged fragmentary section showing mounting of the pocket and gate members.

FIG. 11 is a partial plan of the modified conveyor.

FIG. 12 is a detail showing the action of the modified form around the feed and discharge sprockets.

FIG. 13 is a view like FIG. 12 showing another modified form of the invention. It resembles that of FIG. 12 but the half gates do not abut to provide the lock up action during flexing.
FIG. 14 is a partial plan of the carrier of FIG. 13 and FIG. 14A is an enlarged view of the carrier as passing around the large diameter bottom loop, cups upside down.

FIG. 15 is a view like FIG. 6 showing an embodiment of the invention wherein half gates are provided, one of which also forms one side wall of the pocket.

FIG. 16 is a partial plan of the carrier of FIG. 15.

FIG. 17 is a view like that of FIG. 6 of still another modified form of the invention having a single gate as in FIGS. 1–8, but modified to provide for a projecting lead in flange of a pocket side wall.

FIG. 17A is a view like FIG. 17 showing the container discharge action.

FIG. 18 is a partial plan view of the conveyor of FIG. 17.

DETAILED DESCRIPTION

Typical Conveyor Path

FIG. 1 is a simplified diagram of a single conveyor hydrostatic cooker embodying the present invention. Cookers of this type are generally known in the art and a typical example, but employing a double conveyor chain construction is shown in the U.S. Pat. to Lee No. 3,286,619, Nov. 22, 1966. Only the features essential to an understanding of the present invention are illustrated in the typical cooker H of FIG. 1. As is known in the art, such cookers include a central combined steam and water leg 10, flanked by an entrance water leg 12 and an exit water leg 14. There is also a large diameter cooling leg 16 at the lower end of the installation.

A conveyor D, the improvement of which forms the subject matter of the present invention, has side chains trained feed and discharge sprockets 20, at which cooked containers are discharged and new containers are fed into the conveyor for processing. The conveyor D has a vertical reach leaving sprockets 20 and is trained around upper sprockets 22 driven by mechanism indicated at 24, the details of which are not critical to the present invention. The conveyor then passes down through the water leg 12 and around a lower, small radius loop 26 and up into the steam leg 10. The conveyor then passes around upper sprockets 28, down through the steam leg 10 and back around a second small diameter lower loop 26a. The conveyor then passes up through the water leg 14 around upper sprockets 22a and forms a large diameter lower loop 30 in the lower cooling leg 16. The carrier loop 30 has a much larger radius than that of the loops 26, 26a. After leaving the lower cooling loop 30 the conveyor returns to the feed and discharge sprockets 20, previously mentioned.

CONSTRUCTION OF THE FIRST EMBODIMENT

A partial diagram of a conveyor or carrier chain D embodying the present invention as it is trained through various parts of a hydrostatic cooker appears in FIGS. 2, 6 and 8 and the detailed construction thereof appears in FIGS. 3–5 and 7.

In this embodiment, the pocket or cup members forming the carriers are mounted on the pin links of the conveyor side chains and a single gate member is mounted on the intervening roller links. As is known in the art, two conveyor chains (only one being shown) indicated generally at 32 support the carriers, and the chain rollers are guided in tracks 33 at various zones in the path. The side chains comprise paired outer and inner roller links 36, 38 mounting pins 40 and rollers 42 (best seen in FIG. 5). Connecting the pins 40 are paired outer and inner pin links 46, 48 and in the embodiment being described, the pocket or body members, indicated generally at 50, are mounted on the inner pin links 48. The pocket members 50 (FIG. 4) are in the form of U-shaped cups having flat sidewalls 52, 54 joined by a bottom wall 56. The sidewalls have outwardly turned lips 52a, 54a. The term "flat," as used in this specification, refers to the inside surfaces of the pocket member sidewalls which are unobstructed so that containers can be readily slid in and out of the cups or pocket members 50 when the gates are opened.

The cups 50 are supported at their ends on their associated pin links 48 by means of bent up channel brackets indicated generally at 57, opposite flanges of which are bolted to the sidewalls 52, 54 of the cups by means of bolts 58. The bases of the channels 57 are bolted to the pin links, 48 by means of bolts 59 (FIGS. 3, 5 and 8). In this form of the invention, the cups 50 are mounted on adjacent pairs of pin links 48.

Except at the feed and discharge sprockets 20, the cups 50 are closed by a single gate 60. The ends of the gates 60 are mounted on abutment arms 62 by means of flanges 63 and bolts 64 (FIGS. 3–5). The abutment arms 62 are mounted on the inner roller links 38 by means of bolts 65 which pass through dependent fingers 66 of the gate arms as best seen in FIG. 3. As will be described in detail presently, in one direction of articulation the gate arms 62 serve as stops or abutments to prevent articulation between the pin links 38 that mount the gates and the roller links 48 that mount the cups. This stop structure is provided by an offset flange 67 on the gate arm 62 (as best seen in FIG. 5) which offset flange provides an abutment surface 68, best seen in FIG. 4, than engages one edge of the associated roller link 48.

OPERATION OF THE FIRST EMBODIMENT

Referring to FIGS. 2 and 6, as the conveyor D approaches the feed and discharge sprockets 20, it passes around the upper inside curve of the tracks 33, and without the gates 60 the containers C would fall out of the cups 50. However, the conveyor chain articulation at this inside curve (leading to the sprockets) is such that the gates 60 are on the outside of the conveyor and they are closed. Each abutment flange 67 engages its associated pin link 48 which locks up adjacent sets of links and effectively doubles the pitch of the chain as well as preventing excessive inward motion of the gates into their associated cups and possibly against the containers therein. The gates 60 cannot open their associated cups 50 until the chain makes an outside bend around the feed and discharge sprockets 20. Articulation around an outside loop, such as that represented by the sprockets 20, causes relative articulation of every pin link with respect to every roller link, and hence as illustrated in FIG. 6, soon after the conveyor is trained around the sets of the sprockets, the leading gates 60 pivot away from their associated, trailing pockets 50 sufficiently to permit gravity discharge of the cans C. This open condition of the cups or pockets 50 is maintained around the sprockets 20 so that new cans C can be fed into the cups. However, after the chain leaves the sprockets 20 and goes around another inside loop through the guides 33 the gates close and the cans
are retained in their cups, the gates remain closed on the vertical reaches.

At this point it should be mentioned that the cup construction of the present invention is particularly useful for handling squat cans D which are fed from their top or bottom faces instead of from their cylindrical sides, as in conventional cookers of this type. However, it will be apparent that, if desired, cylindrical cans can be fed in from their sides in the usual manner.

FIG. 2 shows the action around one of the two lower water leg loops, namely the loop 26. In this loop, the cups 50 are bottom down, but due to the buoyant action of the water on the containers C within the cups, there is a tendency for containers to float out of the cups. However, these loops represent inside bends and as mentioned before, the effect of articulation around inside bends is to cause the gates 60 to close their associated cups 50 and the abutment surfaces 68 on the gate arm 67 engage the associated edges of the pin links 48 that mount the cups. This locks up every other set of pin and roller links so that they articulate together. Thus, dislodgement of the containers is positively prevented around the small diameter loops 26, 26a (FIG. 1) that pass through water chambers.

As previously mentioned, the gates are closed along all of the vertical reaches of the conveyor so that the containers are trapped within their pockets.

As also seen in FIG. 2, the bottoms of the cups 50 are disposed downwardly when the conveyor passes around the upper sprockets 22 and this also applies to the passage around the sprockets 28 and 22a (FIG. 1). The diameter of the loops around these upper sprockets is greater than the diameter of the feed discharge sprockets 20, but since the upper sprockets represent outside loops, articulation is permitted at every pin 40 and the gates 60 partially open. However, these loops are not subjected to the buoyant action of water and since the cups are bottom down, gravity maintains the containers C in their pockets. Furthermore, it will be noted that the gates themselves are not fully open, as they are around the smaller diameter feed and discharge sprockets 20.

FIG. 8 shows the action of the conveyor D at loop 30 through the large diameter lower water leg 16. In this loop the cups 50 are bottoms up and hence the buoyant action of the water does not tend to dislodge the containers through the cup openings. The large loop 30 is an outside loop and hence articulation occurs at all chain link pin ends 40 tending to partially open the gates 60. However, the diameter of the loop 30 is large enough so that the gates open only slightly, thus maintaining the containers C in the cups 50 against the force of gravity.

Thus, it may be seen that in the first embodiment of the invention described in FIGS. 2-8, positive retention of containers is provided against the force of gravity and against the buoyant effect of water, in zones wherein these effects would tend to dislodge the containers from their cups or pockets. However, due to the cooperative cup and gate action described, the cups can be made without projections that interfere with loading and unloading containers, and particularly squat containers loaded to rest on their bottoms or top surfaces, so that all the pockets can have flat internal surfaces that facilitate feed and discharge, yet there is no danger of losing control of the containers throughout the critical zones in the cooking path.

SECOND EMBODIMENT

FIGS. 9-12 show a second embodiment of the invention wherein the conveyor D2 differs from the conveyor D in several respects. In the first place, although the side chains 132 of this form have alternate pin and roller links, instead of having all the cup members mounted on pin links, as in the previous form, the cup members are mounted alternately on pin and roller links with an additional link disposed between the cup mounting links. A second difference is that two half gate members cooperate to close each cup member and a third difference is that instead of having the lockup or abutment means coat between adjacent articulated links the half gate members abut one another, to limit the closing action of the gate for each cup.

Thus, in accordance with the principles mentioned above, and as best seen in FIGS. 11 and 12, a cup member 150 is mounted on pin links 148, followed by a cup member 150a mounted on roller links 138, the latter being followed by another cup member 150 mounted on pin links 148. The pin link cup members 150 are closed by a half gate 160 mounted on an upstream roller link 138b and by another half gate 161 mounted on a downstream roller link 138c. The roller link members 150a are closed by a half gate 160a mounted on upstream pin links 148b and by another half gate 161a mounted on downstream pin links 148a. Thus, the sequence along the chain, in its direction of motion is as follows: Roller links 138a and their half gate 161, pin links 148 and then cup 150, roller links 138b and then half gate 160 for the cup 150; pin links 148a and then half gate 161a, roller links 138 mounting cup 150a, and pin links 148b mounting the half gate 160a for the cup 150a.

The construction for mounting the cups 150, on their associated links 148, are found in FIG. 10. Arms 155 project from the mid portion of the pin links 148 and have horizontal flanges 157. End stops 158 for the cups 150 have flanges 158a that are bolted to the bottom 156 of the cups by means of bolts 159, which then pass through the flanges 157. The cups (as do the cups 150) have flat sidewalls 152, 154. A duplicate of this construction mounts the cups 150a on the roller links 138, as seen in FIG. 12.

The operation of the construction of FIGS. 9-12 is the same as that of the first embodiment previously described, except that in this construction, because of the extra intervening link, the cups 150, 150a can be made deeper without mutual interference around the feed and discharge sprockets 20a. Also, the latter sprocket is made of somewhat larger diameter than the first embodiment and since the gates are half gates they will open fully for feed and discharge, as shown in FIG. 12, even though the sprockets 20a are larger. The retaining action of the gates on the containers at the various critical portions of the path of the conveyor D2 around the hydrostatic cooker are the same as that previously described in connection with the first embodiment of the invention.

THIRD EMBODIMENT

A conveyor D3, representing a third embodiment of the invention, is shown in FIGS. 13, 14 and 14a. This embodiment resembles the first embodiment in that the cups 250 are mounted on alternate links with a single link inbetween. However, in the third embodiment, the
cups 250 are mounted on the roller links 238 instead of on the pin links 48, as in the first embodiment. On the other hand, the third embodiment resembles the second, in that the gates 260 are half gates, but the gates themselves differ in that each gate half closes one of the cups and partially closes an adjacent cup. In the third embodiment the gates do not abut, as in the second. In the third embodiment stop arms 267 engage adjacent links (similar to the first embodiment) to limit the closing motion of the gates. However, in the third embodiment the stop arms are on the pin links 248 instead of on the roller links 38, as on the first embodiment.

The cups 250 are mounted on the roller links 238 (as mentioned) by means of extensions 255 of those links, which are flanged over at 257 (see FIG. 14A) and which mount the cups 250 as well as end plates 258 for the cups by means of bolts 259 (see the middle of FIG. 14). In this respect, the cup mounting is similar to that of the second embodiment of FIGS. 9 - 12. The dual half-gates 260 of the third embodiment are mounted on the pin links 248 by means of flanges 270 projecting from ears on the pin links, and bolts 271.

The operation of the third embodiment of conveyor D3 is like that previously described. FIG. 14A shows how a range of sizes of squat cans C are prevented from falling out of the conveyor when the gates are closed around the large bottom top 30. FIG. 13 shows how the gates, when fully open, completely clear the outside 252, 254 of the cups 250 for feeding and discharge of the containers C.

FOURTH EMBODIMENT

FIGS. 15 and 16 show a conveyor D4 which resembles that of the third embodiment conveyor D3 shown in FIGS. 13 to 14A, except that each gate member also forms one sidewall of the pocket members for the containers.

In this embodiment, the partial cups 350 have one sidewall 354 and a bottom wall 356. The partial cups are mounted on the roller links 338. The other sidewall for the partial cup 350 is formed by cooperation of a radial flange 352 that mounts the dual half gates 360 on ears 362 projecting from the pin links 348. The partial cups 350 are mounted on link extensions 355 having flanges 357, along with end plates 358 by means of bolts 359, in a construction very similar to that of the conveyor D3 in FIGS. 13 to 14A.

As seen in FIG. 15, the fourth embodiment is also useful for conventional processing of cylindrical containers C, which are fed and discharged on their sides. In this embodiment, due to the fact that the gate members have oppositely projecting flanges 360a, 360b that cooperate to close the cups and further, due to the fact that each gate member embodies one sidewall 352 for the cups, the relative size of the openings as the conveyor D4 passes around the feed and discharge sprockets 20c is somewhat greater than that of the previous embodiments. As is also indicated at the bottom of FIG. 15, this construction will incorporate a range of can sizes mounted on their sides.

Articulation of the conveyor chains 332 of the fourth embodiment is prevented around inside loops and permitted around outside loops by stop arms 367 projecting from the pin links 348 and engaging the adjacent roller links 338 in the manner of the first and third embodiments, previously described. The container retaining action as the conveyor D4 passes around the hydrostatic cooker path is the same as before. As in all embodiments, a track 33 guides the conveyor rollers around the critical portions of the path.

FIFTH EMBODIMENT

FIGS. 17 - 18 show a conveyor D5 representing a fifth embodiment of the invention. This embodiment closely resembles the first embodiment in FIGS. 1 - 8 in that a single gate 460 is employed. Also, as in the first embodiment, the cup members 450 are mounted on pin links 448 and the gates 460 are mounted on the roller links 438. The cup members 450 are mounted on bent up channel brackets 457 that are bolted to the pin links 448 in a construction that is substantially like that of the first embodiment described in connection with FIG. 5. The brackets 457 have terminal flanges 458 (FIG. 18) that serve as end stops for containers in the cups. The gates 460 are bolted to ears 462 projecting from the roller links 438 and in this form, the gates do not completely close the cups although they do cover the open ends of the cups sufficiently to prevent squat cans C from sliding out at critical zones around the processing conveyor. In the fifth embodiment the downstream pocket sidewall 452 at the loading and discharge positions is longer than the upstream sidewall 454, which construction, when taken in conjunction with the wide open gates 460 facilitate the loading and discharge operations. The loading operation appears in FIG. 17 and the discharge operation appears in 17A, it being noted by comparison of these figures that the gates are not open simultaneously for loading and discharge, as in some of the previous embodiments.

Stop fingers 467, like those of other embodiments, project from the roller links 438 and engage the edges of the pin links 448 in the manner previously described.

The operation of the fifth embodiment around the processing conveyor is like that described in conjunction with the first embodiment.

Having completed a description of several embodiments of the present invention it can be seen that all of them allow the processing conveyor that passes around several critical paths in hydrostatic cookers, including water legs and legs wherein container cups are upside down. Also, full opening of these normally closed cups is provided as the conveyor passes around sprockets for feed and discharge of the containers.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and variation may be made without departing from what is regarded to be the subject matter of the invention.

What I claim is:

1. A processing conveyor for hydrostatic cookers or the like of the type wherein the conveyor comprises laterally spaced endless chains connected by transverse container carrier members; said conveyor having upper sprocket loops, relatively large and small radius lower loop, vertical reaches connecting these loops, and a small radius feed and discharge sprocket loop in an outside vertical reach; the improvement wherein said container carrier members each comprises a container pocket member, each pocket member comprising at least one substantially flat sidewall and a single bottom wall wide enough to completely support a container, means mounting the ends of said pocket members on
spaced pocket member mounting chain links, said latter links being connected by intermediate chain links, all of said pocket members being mounted on said pocket member mounting chain links; the bottoms of said pocket members facing out at said feed and discharge loop, said bottoms facing up at said upper sprocket and smaller radius lower loops, said bottoms facing down at said larger radius lower loop; closure gate means for each pocket member, means mounting said gate means on said intermediate links between said pocket member mounting links so that articulation of said links in one direction opens the gates and articulation in the other direction closes the gates, and abutment means independent of said pocket members for holding these links against further articulation in the pocket closing direction after the gates have closed their pockets, as at the bend in the conveyor that approaches said feed and discharge sprocket loop when the pocket bottoms are up, as well as around said smaller radius lower loops when the bottoms are down; said abutment means accommodating full gate opening articulation of these links around said feed and discharge sprocket loops as well as accommodating partial gate opening around said relatively large radius lower loops when bottoms are up, the latter loop having a radius large enough so that gate opening articulation of these links does not open the gates sufficiently to drop out containers.

2. The processing conveyor of claim 1, wherein said pocket members each comprises a generally U-shaped cup having substantially flat sidewalls and a bottom wall.

3. The improved conveyor of claim 2, wherein the closure gate means for each cup member comprises oppositely projecting half-gates mounted on the links at each side of those mounting the cup members.

4. The improved conveyor of claim 3, wherein there are two links between each cup mounting link, said abutment means serving to lock up a cup mounting link with each adjacent half-gate mounting link.

5. The improved conveyor of claim 3, wherein said abutment means comprises stop arms mounted on one of the links for engagement with the adjacent link.

6. A processing conveyor for hydrostatic cookers or the like of the type wherein the conveyor comprises laterally spaced endless chains connected by transverse container carrier members, said conveyor having upper sprocket loops, relatively large and small radius lower loops, vertical reaches connecting these loops, and a small radius feed and discharge sprocket loop in an outside vertical reach; the improvement wherein said container carrier member each comprises a generally U-shaped cup member having substantially flat sidewalls and a bottom wall, means mounting the ends of said cup members on spaced chain links; the bottoms of said cup members facing out at said feed and discharge loop, said bottoms facing up at said upper sprocket and smaller radius loops, said bottoms facing down at said larger radius lower loop; closure gate means for each cup member, means mounting said gate means on links between said cup member mounting links so that articulation of said links in one direction opens the gates and articulation in the other direction closes the gates, and abutment means for holding these links against further articulation in the cup closing direction after the gates have closed their cups, as at the bend in the conveyor that approaches said feed and discharge sprocket loop when the pocket bottoms are up as well as around said smaller radius lower loops when the bottoms are down, said abutment means accommodating full gate opening articulation of these links around said feed and discharge sprocket loops as well as accommodating partial gate opening around said relatively large radius lower loops when bottoms are up, the latter loop having a radius large enough so that gate opening articulation of these links does not open the gates sufficiently to drop out containers, said cup members being mounted on alternate links, the closure gate means for each cup member comprising a single gate mounted on links between the cup member mounting links, each gate closing the majority of a cup member.

7. The improved conveyor of claim 6, wherein said abutment means comprises stop arms mounted on one of the links for engagement with the adjacent link.

8. The improved conveyor of claim 7, wherein said stop arms are on the gate mounting links and also serve to mount the gates.

* * * *
CERTIFICATE OF CORRECTION

Patent No. 3,770,104 Dated October 5, 1974

Inventor(s) JAMES L. REIMERS

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 8, line 61, before "vertical" change "loop" to -- loops--.

Col. 9, line 25, before "bottoms" insert -- the --.

Signed and sealed this 14th day of January 1975.

(SEAL)
Attest:

McCOY M. GIBSON JR. C. MARSHALL DANN
Attesting Officer Commissioner of Patents