Oct. 25, 1938. J. A. HOPWOOD 2,134,251

MILK BOX

Filed Nov. 21, 1935 2 Sheets-Sheet 1

Fig. 1

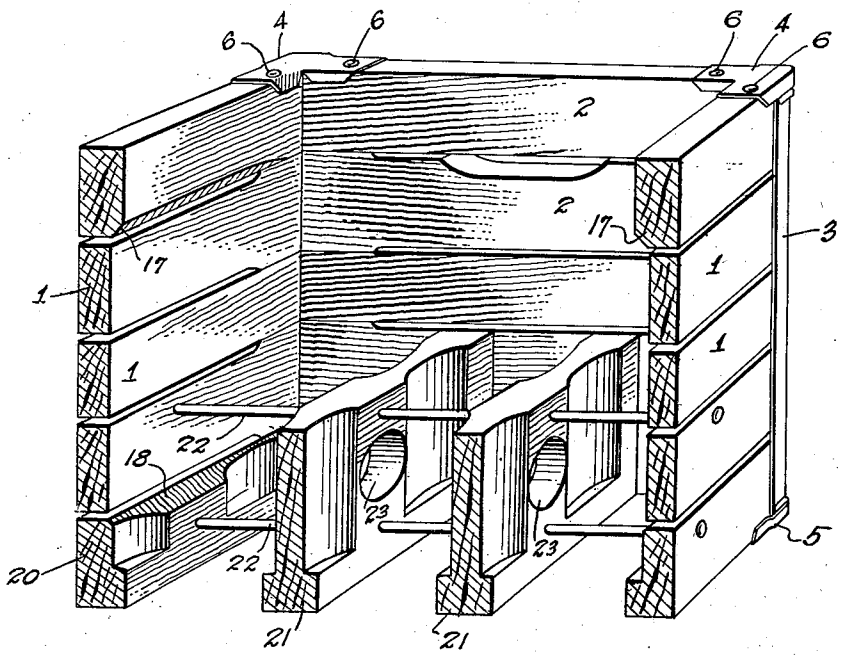


Fig. 2

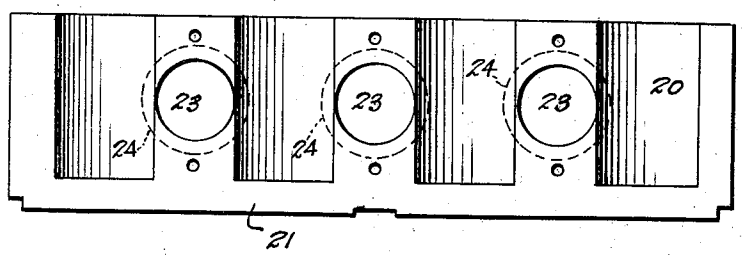
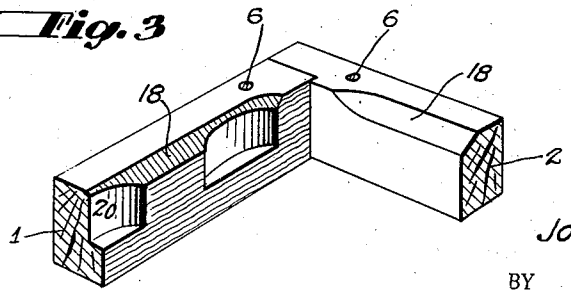


Fig. 3



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Fig 4

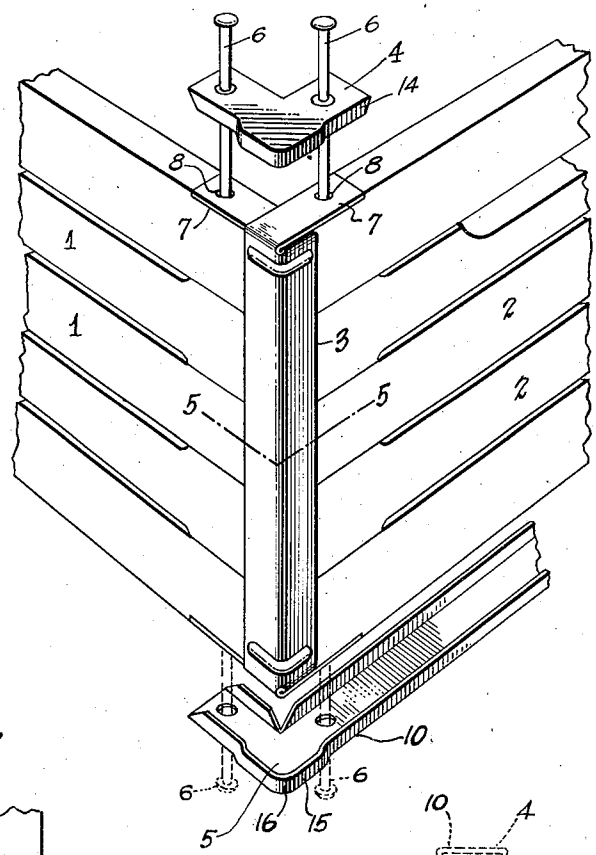


Fig. 5

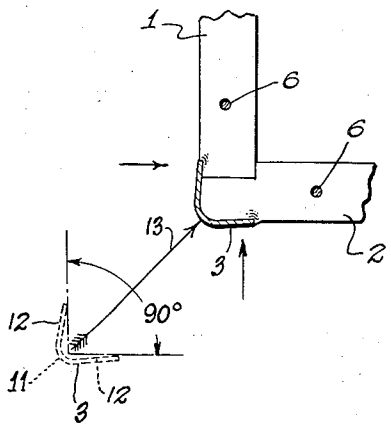
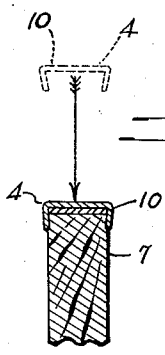


Fig. 6



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2,134,251

UNITED STATES PATENT OFFICE

2,134,251

MILK BOX

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14 Claims. (Cl. 217—69)

This invention relates to milk boxes and more particularly those used in connection with the retail delivery of bottled milk. These boxes are provided with compartments, usually twelve in number, to individually hold a dozen bottles in each box. It is the practice to set the bottles upright in the compartments of the box and pack ice about the necks of the bottles so as to keep the milk at a desired temperature.

Boxes of this kind present numerous problems in connection with their manufacture, maintenance and use. For example, milk boxes are generally made of wood or at least have wooden side walls, usually made by superimposing slats above one another, so as to obtain a strong construction and at the same time minimize weight and provide for ventilation. The slat construction is well adapted for these purposes. With a slat box, however, the corners of the box must be made quite strong as the slat wall does not have the inherent rigidity of a solid wall and, unless these corners are able to stand considerable strain, the ends of the slats at the corners are apt to break away. For these reasons most milk boxes now made are provided with corner irons which cover the joinery at the corners of the box and reinforce the same. The corner irons effectually support the ends of the slats in cooperative relation with one another, but my experience has shown that there is a marked tendency on the part of these corner irons to catch in adjacent boxes when they are moved in close relation to one another or are subjected to rough usage, so that it is not uncommon to find the corner irons sufficiently loose at the sides of the box that they may be readily caught in protuberances in the path of the box and bent away from the box to form projections which may produce serious damage to conveyors and other transporting apparatus.

One of the objects of this invention is to so form the corner iron and apply it to the box in such manner that it will hug the sides of the box tightly and will not be apt to be caught and bent out of shape. I have discovered that this may be accomplished by forming the corner irons of a section wherein, prior to application, they are of an angle less than 90 degrees. Being of metal they have pronounced inherent resiliency and this fact makes it possible, when the angles are so formed, to force the angle iron under resilient stress into proper position at a corner of the box and by thereafter anchoring the ends of the corner iron at the top and bottom of the box, the whole corner iron will be held under a condition of stress wherein its inherent resiliency will keep it tightly in position and cause it to hug the walls of the box tightly. In addition to this I may also apply positive pressure along the margins of the corner irons after attachment, so as to force them under great pressure somewhat into the wood, so that it is practically impossible in the ordinary use of a box to catch the edges of these angle irons.

My experience with angle irons applied in the manner described is that they practically eliminate the objection to which I have referred.

The corner caps, which cover the upper and lower edges of the box at the corners and which at the bottom of the box may form part of the runners, are open to similar objections in prior constructions and may be manipulated, in accordance with this invention, in a like manner, that is to say, they may be formed in such a way that they are sprung into place under stress which remains in these parts and causes them to tightly and resiliently grip the walls of the box, pressure being applied to the margins of these caps if it is so desired.

Another object of the present invention is to provide for a more efficient distribution of the ice which, in practice, is adapted to be packed around the bottles. It is of course apparent that the greater the surface contact of the bottle with the ice, the greater will be the cooling effect. In practice, however, the ice is simply dumped into the top of the box, after the bottles have been set into the box, and the distribution of the ice is frequently not conducive to the best results. This is particularly true in boxes where compartments are formed by wooden spacers or partition members and where the partition members are sufficiently deep to support the bottle for the full height of its support. With such a construction much of the ice may enter into the space between two adjacent partition members or between one partition member and one wall of the box leaving much less ice between the other partition members and the walls of the box.

I find that this may be largely remedied by providing the partition members with relatively large openings therein, so that, when the box is moved or vibrated as in handling, the ice will distribute itself through these holes to a considerable extent and give a much better distribution than would otherwise be the case. The present invention includes the use of these openings. The openings have the further advantage in that they decrease the weight of the box without appreciably weakening the partitions.

Furthermore in some boxes of this kind, the

bottom slats and top slats of the walls of the box have been made thicker to give the strength where it is most needed, but some difficulty has been experienced with this construction as there is a tendency of the bottles to catch against the projecting edges of these slats. Consequently, in the box of the present invention, these thickened slats are beveled at their edges adjacent to the inner slats and into conformity therewith, as hereinafter more fully described, but the beveling is so carried out as to not weaken the slats at their ends where maximum cross section and strength is required.

Features of the invention, other than those adverted to, will be apparent from the hereinafter detailed description and claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate one practical embodiment of the invention, but the construction therein shown is to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a section perspective view of one end of a box embodying the present invention.

Figure 2 is a side elevation of one of the partition members of the box of Figure 1.

Figure 3 is a fragmental perspective showing adjacent ends of two bottom slats at one corner of the box.

Figure 4 is a fragmental perspective of one exterior corner of the box showing certain parts of the hardware removed in the interest of clearness.

Figure 5 is a horizontal section taken through one corner of the box in the plane of the line 5—5 of Figure 4 showing in a diagrammatic way the manner of applying the corner irons.

Figure 6 is a vertical section through one of the upper slats and corresponding corner cap showing how the corner cap is applied under stress.

The box of the present invention comprises four walls arranged in rectangular relation to form a rectangular frame. The side walls embody superimposed slats **1**, while the end walls are made up of superimposed slats **2**. The slats of the several walls are properly joined at their ends to form the corners of the box which are maintained in assembled relation by means of corner irons **3**, corner caps **4** and combined corner caps and runners **5**.

Tie rods **6** extend through the corner caps, corner irons, runners and through the slats to secure the slats to one another and to the hardware and thus hold the parts in assembled relation. The corner irons are all made the same way and are shown best in Figures 4 and 5. Each embodies a strip of sheet metal bent to form an angle adapted to extend vertically along the corner of the box and at the top and bottom of each of these corner irons are formed tongues **7** which overlap the upper and lower edges of the top and bottom slats, respectively, and are perforated as shown at **8** for the passage of the tie rods **6**. The tongues **7** at the top of each corner iron are adapted to be covered and concealed by corner caps **4**, while the corresponding tongues at the bottom of each corner iron are adapted to be covered and concealed by runners **10**, so shaped as to form corner irons **5** at their opposite ends. Both the runners **10** and the corner caps **4** are also perforated for the passage of the tie rods **6**, as will be apparent from Figure 4.

One important feature of this invention, as hereinbefore stated, consists in the manner of associating the corner iron **3** with the corner of the box. I have graphically illustrated in Figure 5 how this is accomplished. For example, in dotted lines in this figure, I have shown a corner angle **3** bent so that its lateral halves are at an angle appreciably less than 90 degrees and the bend **11** is made on a relatively large radius. The material used is of resilient character and by forming the angle in this way, the two arms or leaves **12** form in effect spring arms joined to or integral with one another through a curve of large radius. This section thus has all the essential prerequisites of a double leaf spring and it is so employed in applying the corner iron to the box. In the course of manufacture, these corner irons are formed with acute angular relation and they are subsequently applied as indicated by the arrow **13** in Figure 5 by pressing them in the direction of this arrow into cooperative relation with the corners of the box. The pressure applied during this operation is sufficient to force them into substantial conformation with the corner of the box. During this operation, the corner irons will be flexed, so as to somewhat increase the angle between the arms **12**, so that this angle will approach 90 degrees, but there will be a tendency of the edges of the corner iron to dig into the walls of the box, as indicated in Figure 5, because of the pressure applied thereto and the tension of these corner irons.

After the corner irons have been forced into place, they are anchored by the rods **6** which keep them in position under tension. They remain under tension throughout the life of the box and produce a tight construction wherein the edges of the corner irons hug the outer surfaces of the walls of the box, so that nothing can catch between them. Furthermore, even though the tie rods **6** loosen up slightly, there will be no looseness in the corner irons and consequently no noise due to rattling or vibration, as is now generally the case in corner irons of conventional construction.

I have shown this acute angular corner iron arrangement in a corner iron provided at its top and bottom with overlapping tongues **7**, but I do not limit the invention in this connection, as the upper and lower ends of the corner irons may be formed otherwise than as shown. In fact it is possible, when the angle irons are applied under pressure and placed under stress, as described, to apply the corner caps and runners directly over the upper and lower ends of corner irons cut off flush with the upper and lower edges of the box and when the corner caps and runners are secured to the box, their outer flanges **14** and **16**, presently described, will serve to hold the corner irons in place under tension without other means of attachment for the latter. The present invention, therefore, is not to be understood as limited to the corner iron which has the overlapping tongues at its opposite ends as shown for the purpose of illustration.

In applying the corner caps **4** and the runners **10**, the same general principle is availed of. These corner caps and runners are of channeled cross section and the channels are made so as to slightly converge, as shown in dotted lines in Figure 6, so that, when the corner caps and the runners are applied to the box, they are forced into place under considerable pressure which flexes the flanges of the channel section and places them under sufficient resilient tension to

tightly grip the walls of the box, as will be clearly apparent from Figure 6. The outer flange **14** of each corner cap, as well as the outer flange **15** of each runner is made continuous and seamless and formed on a large radius at the corners **16**, so as to conform with the radius of the bend in the corner irons and impart to the box round corners throughout.

It may be desirable in some cases, after application of the corner irons, corner caps and runners, to subject the marginal edges thereof directly adjacent the wooden slats with which they cooperate, to considerable pressure to actually force the free edges of these metal parts to embed themselves to greater extent into the wooden slats and give a flush exterior, but ordinarily I do not feel that this is necessary, although it is within the present invention to do so.

As shown best in Figures 1 and 3, the top and bottom slats of the box are made thicker than the intermediate slats and to keep the bottles from catching and to facilitate the insertion into and removal from the box, the interior bottom edges of the top slats are beveled, as shown at **17**, and the inner top edges of the bottom slats are similarly beveled at **18**. It should be noted, however, that these bevels terminate short of the ends of the slats, as best shown in Figure 3, so as to leave the slats of full thickness at their extremities for maximum strength in the joint at the corners of the box.

The bottom side slats are provided with bottle receiving and supporting recesses **20**, and partitions **21** are similarly recessed and extend longitudinally of the box and divide the interior thereof into compartments. Upper and lower stay rods **22** serve to strengthen and support the partitions **21** and therefore assist in forming the interior of the box into pockets.

It is to be noted that in the box shown the partitions **21** extend for the full height of the support which it is desired to impart to the bottles, so that these partitions actually insulate the lower intermediate portions of the box from one another. If imperforate there will be no communication between these portions of the box at the level between the upper and lower edges of the partitions. This is undesirable as it interferes with proper ice distribution. Consequently I form in the partitions openings **23**. These openings are so disposed that they will pass through the thickest parts of the partitions and between adjacent bottles, so that ice falling down between adjacent bottles can pass through the partition into the transversely adjacent compartment and thus make it possible to get proper ice distribution. The openings **23** are preferably made as large as can conveniently be the case and while they serve the purpose described and appreciably lessen the weight of the partitions, they do not decrease their strength. Figure 2 shows one of the partitions in elevation and from this view the preferred disposition of the openings can be more clearly seen.

If desired I may bevel or countersink the opposite ends of each opening **23**, as indicated in dotted lines at **24** in Figure 2, so as to let the ice pass more freely and to lighten the weight of the partitions. A further advantage of the openings **23** is that they permit the partitions to dry out more quickly after wetting.

The procedure of forming a corner iron of less than 90 degrees, and the subsequent forcing or stressing of this corner iron into substantial conformity with the corner of a box and the anchoring of the corner iron to the box, while in its stressed condition, constitutes a method forming part of the present invention. The procedure of applying the corner caps and runners in stressed condition also constitutes a method forming part of this invention.

The foregoing detailed description sets forth the invention in its preferred, practical form. I am aware, however, that certain features which I have described may be used to advantage in milk crates without necessarily employing all the features referred to. Consequently, the present invention is to be understood as not limited to the specific showing, but is to be construed as fully commensurate with the appended claims.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A milk box provided at each of its four corners with an upright corner iron of an unstressed angular cross section less than a right angle, and means for anchoring each corner iron to one corner of the box with the angular cross section of such corner iron stressed to approximately a right angle for the purpose of causing the lateral free edges of the corner irons to hug the walls of the box tightly.

2. A milk box provided at each of its four corners with an upright corner iron of an unstressed angular cross section less than a right angle, and means for anchoring the upper and lower ends of each corner iron to one corner of the box with the angular cross section of such corner iron stressed to approximately a right angle for the purpose of causing the lateral free edges of the corner irons to hug the walls of the box tightly.

3. A milk box provided at each of its exterior corners with a corner iron having a rounded corner integrally joining the two lateral halves of the corner iron and which lateral halves are arranged, when free from stress, at an angle less than 90 degrees, means for securing each corner iron to one corner of the box with the lateral halves of such corner iron stressed into substantial conformity with the corner of the box, and corner caps covering the upper and lower edges of the box at each corner, each corner cap having a flange overlying the exterior of the box at its corner and rounded to conform with the corner iron.

4. A milk box provided at each of its exterior corners with a corner iron having a rounded corner integrally joining the two lateral halves of the corner iron and which lateral halves are arranged, when free from stress, at an angle less than 90 degrees, each corner iron being secured to one corner of the box with the lateral halves of such corner iron stressed into substantial conformity with the corner of the box, and corner caps covering the upper and lower edges of the box at each corner, each corner cap having a flange overlying the exterior of the box at its corner and rounded to conform with the corner iron, and tie rods extending longitudinally through the walls of the box and through the corner caps to bind said corner caps and corner irons to the walls of the box and hold the box in assembled relation.

5. A milk box provided at each of its upper corners with a corner cap, each corner cap being provided at its inner and outer edges with flanges converging toward their free edges when free from stress and said caps being forced into engagement with the walls of the box to embrace

said walls under stress, and means for securing the corner caps in position.

6. A milk box comprising a plurality of superimposed courses of slats, the top and bottom slats being thicker than the intermediate slats and all of the slats being arranged flush at their outer surfaces, the bottom inner edges of the top thicker slats and the upper inner edges of the bottom thicker slats being beveled off to the thickness of the intermediate slats.

7. A milk box provided with partitions extending across the interior of the box to divide said interior into a plurality of compartments, each of said partitions being provided at its opposite sides with recesses extending for the greater portion of the height of said partitions and provided at their bottoms with seats for individual bottles, said seats being spaced longitudinally of the partitions, and said partitions being provided, in the spaces between successive seats, with openings passing through the partitions and through which ice introduced at one side of any particular partition may pass to the other side of such partition.

8. A milk box provided with partitions extending across the interior of the box to divide it into a plurality of compartments, each of said partitions being provided at its opposite sides with upright recesses terminating at their bottoms in seats for individual bottles, said recesses being spaced longitudinally of the partitions to leave those longitudinal intermediate portions of the partitions between recesses of substantially uniform thickness throughout the height of the recesses, and openings cut through said intermediate portions and through which ice, introduced at one side of any partition, may pass to the other side of such partition.

9. A milk box provided with partitions extending across the interior of the box to divide it into a plurality of compartments, each of said partitions being provided at its opposite sides with upright recesses terminating at their bottoms in seats for individual bottles, said recesses being spaced longitudinally of the partitions to leave those longitudinal intermediate portions of the partitions between recesses of substantially uniform thickness throughout the height of the recesses, and openings cut through said intermediate portions and through which ice, introduced at one side of any partition, may pass to the other side of such partition, the opposite ends of said openings being countersunk to facilitate the passage of ice therethrough.

10. A milk box provided with partitions extending across the interior of the box to divide it into a plurality of compartments, each of said partitions being provided at its opposite sides with upright recesses terminating at their bottoms in seats for individual bottles, said recesses being spaced longitudinally of the partitions to leave those longitudinal intermediate portions of the partitions between recesses of substantially uniform thickness throughout the height of the recesses, and openings cut through said intermediate portions and through which ice, introduced at one side of any partition, may pass to the other side of such partition, the opposite ends of said openings being countersunk to facilitate the passage of ice therethrough.

11. A milk box provided at each of its four corners with an upright corner iron of angular section, the lateral halves of which, when free from stress, are at an angle less than a right angle, the upper and lower ends of said corner irons being extended to overlie the upper and lower edges of the box, and means passing through said extensions of the corner irons for anchoring the corner irons to the box with the lateral halves of each corner iron stressed into substantially right angular relation to one another, whereby the free edges of each corner iron are resiliently maintained in firm engagement with the underlying walls of the box.

12. A milk box provided at each of its four corners with an upright corner iron of angular section, the lateral halves of which, when free from stress, are at an angle less than a right angle, and the upper and lower ends of which corner irons are extended to overlie the upper and lower edges of the box, and tie rods extending vertically through the walls of the box and through the extensions of the corner irons to secure said corner irons to the box with the lateral halves of each corner iron stressed into substantial conformity with the corresponding corner of the box.

13. A rectangular milk box provided at each of its four corners with a resilient upright corner iron enclosing the corresponding corner of the box and having, when in unstressed condition, a re-entrant angle less than a right angle, each of said corner irons being secured in place about one corner of the box under such stressed condition as to horizontally increase said re-entrant angle and cause the free edges of the corner iron to engage the box walls under resilient stress, and each of said corner irons having extensions overlying the upper and lower edges of the box, and tie rods passing vertically through the walls of the box and through the extensions of the corner irons to secure the corner irons in place in said stressed condition.

14. A rectangular milk box provided at each of its four corners with a resilient upright corner iron enclosing the corresponding corner of the box and having, when in unstressed condition, a re-entrant angle less than a right angle, each of said corner irons being secured in place about one corner of the box under such stressed condition as to horizontally increase said re-entrant angle and cause the free edges of the corner iron to engage the box walls under resilient stress, and means for securing said corner irons in place on the box in said stressed condition.

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