Jan. 5, 1937. T. L. CUNNINGHAM 2,066,337

WATERPROOF BOX

Filed April 18, 1935 2 Sheets-Sheet 1

Fig. 1

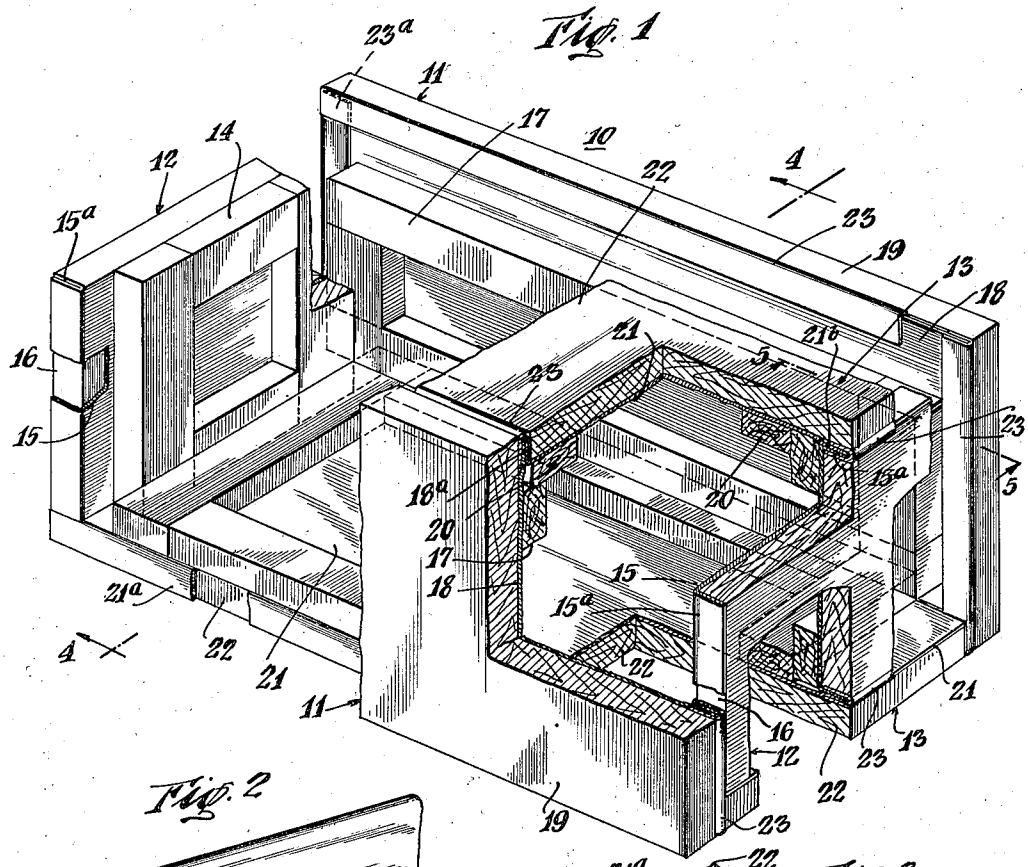

Fig. 2

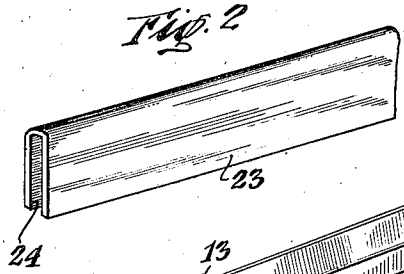

Fig. 3

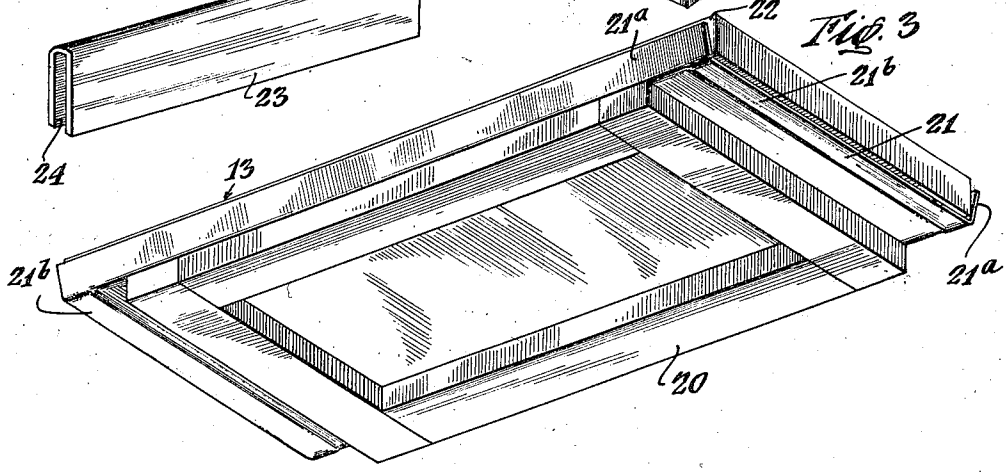

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Fig. 4

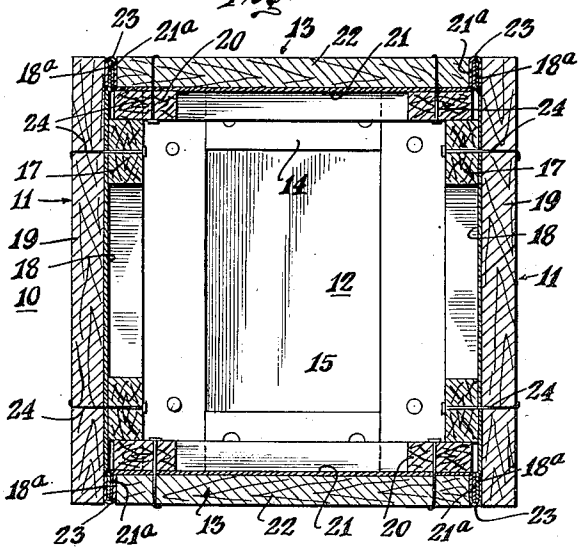


Fig. 5

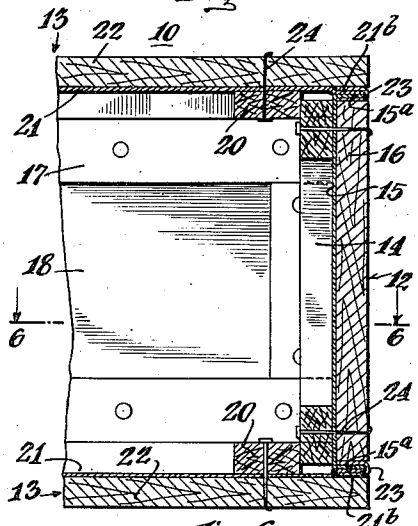


Fig. 7

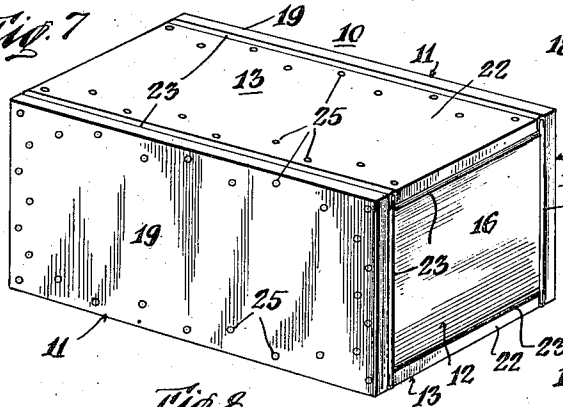


Fig. 6

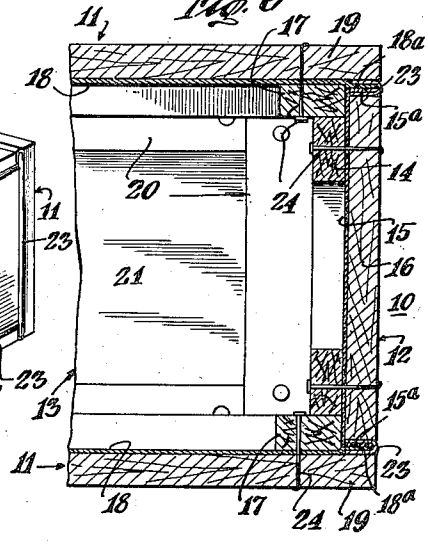


Fig. 8

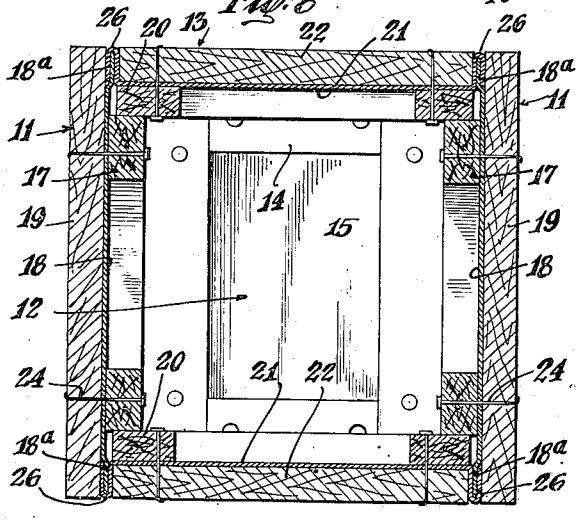
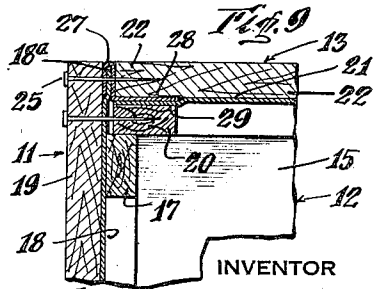


Fig. 9



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Patented Jan. 5, 1937

2,066,337

UNITED STATES PATENT OFFICE

2,066,337

WATERPROOF BOX

Thomas L. Cunningham, New York, N. Y.

Application April 18, 1935, Serial No. 16,991

8 Claims. (Cl. 217—12)

My invention relates to boxes and crates, and more particularly to waterproof boxes for shipping purposes.

I am aware of some of the numerous attempts, which have been previously made, to produce boxes that would be absolutely waterproof and prevent rust or other deleterious effects upon the materials contained in the box during storage and shipment. All such attempts, however, have fallen short of their intended purposes, for although the major portion of the water is prevented from entering the box there is nevertheless a sufficient penetration of moisture to cause rusting of metal parts and spoilage of fabrics or food contained in the box.

In some of the prior art boxes expensive metal linings, for example, zinc or tin, are employed for preventing moisture penetration. The inherent cost involved in the manufacture of such boxes renders them prohibitive to the majority of the trade, as evidenced by their scarcity upon the market. Furthermore, such boxes are seldom water-tight around their top and bottom edges, for it is practically impossible to fold the metal lining so that water will not seep in through the cracks in the folded portions. Therefore, in addition to the undesirable high cost of these boxes, they are not entirely moisture proof and do not fill the present day needs.

Another type of prior art box intended to be waterproof comprises a combination of wood and paper. Although this box is not subject to the undesirable high cost feature it does not completely keep out the water and as a result it cannot be relied upon to protect its contents against the harmful results of moisture, for example, rust, mildew and decay. One of the principal reasons for failure in this type of box is that there are no adequate provisions for filling or sealing cracks along the top, bottom and side edges of the box.

An object of my invention is to provide a box that is entirely water-resistant and will maintain the contents packed therein free from rust, mildew, decay or other harmful effects normally caused by water.

The novel features of my box are set forth with particularity in the appended claims. The structure and specific waterproof features of my box, however, will be clearly understood from the following more specific description taken in conjunction with the accompanying drawings, in which like reference characters identify similar parts. In these drawings:

Figure 1 is a perspective view of my box with several parts broken away to show the internal construction and the means for rendering the top, bottom and side edges water-tight;

Figure 2 is a detail of one type of filler that I use in combination with the waterproof inner lining of my box to form a water-tight gasket between the joined members of the box;

Figure 3 is a perspective view, from the underneath side, of the top or bottom member of my box showing the inner frame, the outer board, and the interposed sheet of waterproof material;

Figure 4 is a vertical sectional view taken along line 4—4 of Figure 1;

Figure 5 is a longitudinal sectional view taken along line 5—5 of Figure 1;

Figure 6 is a horizontal sectional view taken along line 6—6 of Figure 5;

Figure 7 is a perspective view of the completed box;

Figure 8 is a vertical sectional view similar to Figure 4 but showing a different type of waterproof gasket, which I may use for forming a water-tight junction between the joined members of my box.

Figure 9 is a fragmentary vertical cross-section showing still another type of waterproof gasket.

Referring now to the drawings, and more particularly to Figures 1, 2 and 3, the box 10, shown in one of its preferred forms, is made of six initially separate panels. In the completed box these panels form the two sides 11, the two ends 12, and the top and bottom members 13, the corresponding members being substantially identical.

The structure of the end pieces 12 is clearly shown at the left hand end of Figure 1. This end piece, like the corresponding front end piece, consists of an inner frame 14, an interposed flexible waterproof sheet 15, and an outside board member 16. The members 14 and 16 are fastened together by means of screws, nails, or the like, such as shown in Figures 4 to 9. The interposed waterproof sheet 15 is not directly fastened to either the inside frame or the outside board but is clamped between the two through the intermediary of the nails. The sheet 15 covers the entire inner surface of the board 16 and has extensions 15a which cover the four sides or edges of the board 16.

The two sides of my box, as clearly shown in Figure 1, consist essentially of an inner frame 17 fastened to an outside board member 19, and an intermediate or interposed sheet of waterproofed

material 18. This sheet 18 is preferably made from the same stock as the waterproof sheet 15 used for interlining the end portions described above. The sheet 18 covers the entire inner surface of the board 19 but does not extend over the edges of the latter for reasons that will be apparent from the description to follow.

The structure of the panels, which form the top and bottom members of my box, may be easily understood from Figure 3. The top and bottom members are preferably identical in structure and, as shown, consist of an inner frame member 20 fastened to an outer board member 22, and an interposed sheet of waterproofed material 21. This sheet 21 is preferably made from the same stock as the sheets 15 and 18, supra, and has slightly offset ends 21*b* which, in the completed box, coincide with the extensions 15*a* of the end members 12, and has side extensions 21*a* which coincide with the offset edges 18*a* of the side sheet 18, in the manner described hereinafter, to form the water-tight gasket. The side and end panels are so constructed that when the inner frames 14 and 17 are placed in the abutting relationship shown in Figure 1, the outside board members 16 and 19 are properly positioned for nailing. Also, the top cross piece of the inner frame 17 is positioned at the proper height to support the frame 20 of the top panel 13, such that the outside board member 22 will lie flush with the top surface of the side members 19. This also causes the gasket 23 to lie flush with the top surface of the box and thereby prevent any possible damage that might occur if it projected beyond the box surface. The latter, of course, applies not only to the top of the box but to the bottom, sides and ends also.

The main purpose of the waterproof linings 15, 18 and 21, supra, is to prevent any moisture that might penetrate the outside board members 16, 19 and 22 respectively from actually and finally entering the innermost portions of the box and spoiling the contents therein. These waterproof intermediate linings may be made of any suitable flexible material that has been rendered sufficiently waterproof to serve my purpose. I have obtained very satisfactory results with waterproof cardboard, although it is to be understood that my invention is not limited to such material. Other waterproof materials having similar physical properties may be used. If desired, this waterproof sheet may be made of corrugated paper or rubber or other such materials. From the practical standpoint, however, I have found that the waterproof cardboard mentioned above, is preferable, in view of its low cost of production.

Regarding the means and method of waterproofing the inner lining, I have found that very satisfactory results can be obtained if paper, such as cardboard, is thoroughly impregnated with the thin liquid waterproofing composition disclosed in a co-pending application, Serial No. 747,887, filed October 11, 1934. Other suitable waterproofing compositions may, of course, be used for impregnating the paper or other lining material.

Although the waterproof sheets 15, 18 and 21 will prevent the major portion of the water, that normally penetrates the box, from reaching the contents therein, these sheets alone would not be sufficient to make the box absolutely water-tight along the edges between the joined members. Therefore to insure against any and all penetration of moisture along such edges and to render the box entirely water-resistant, I have provided a water-tight gasket arrangement. One form of this gasket is illustrated in Figure 2 and, as shown, consists of a substantially U-shaped member 23 having a longitudinal opening 24. This member 23 is preferably made from the same stock of waterproof material from which the inner linings 15, 18 and 21 are formed.

The U-shaped gasket 23 is placed along each joined edge of the box, that is, between the side panels 11 and the top and bottom panels 13, and also along each end of the box between the end panels 12 and the top and bottom panels 13. In this manner the box 10 is completely sealed along its entire joined surfaces. While it is preferable to apply the gasket between each of the joined members, it is of course understood that any lesser number of these gaskets may be used, and I have found in actual practice that the gasket between the top member 13 and the end members 12 may sometimes be omitted. The particular reason for this is that the top panel 13 is normally the last one applied, and may, therefore, be very firmly affixed to the other members so that little opportunity of moisture penetration between its joined edges is afforded. However, to insure absolute waterproof conditions, gaskets should be used along each joined edge, as shown. To further insure a water-tight joint between the side panels 11 and the end panels 12, the end and side gaskets 23 overlap or lock at their junction, as indicated by the dotted section 23*a* in Figure 1.

Short sections of the gasket 23 are shown in perspective in Figure 1, but the complete gasket and its association with the waterproof interlinings 15, 18 and 21 will be clearly understood from a consideration of Figures 4, 5 and 6. Referring now to these figures, and particularly to Figure 4, it is to be noted that the waterproofing lining 18 extends the full length of the side members 19 and its side extensions 18*a* are parallel therewith and are practically straight, except for a slight offset. The interlinings 21, extending the full length of the top and bottom members 22, however, are bent along their side edges at substantially right angles to form the extensions 21*a*. These extensions lie parallel to and in close contact with the extensions 18*a*, permitting the waterproof gasket 23 to be slipped over and completely cover each of these extensions.

As shown, this gasket 23 is closed at the outer surface of the box and presents a waterproof barrier to any moisture that might normally tend to penetrate between the extensions 18*a* and 21*a*. The gasket 23 completely fills the space between the side members 19 and the top and bottom members 22 so that when these members are joined by means of the nails 24, a water-tight joint is effected. If by any chance the members 19 become slightly separated from the members 22 and water penetrates therebetween along the outer surfaces of the gasket 23, such water will nevertheless not be permitted to reach the interior of the box, because it will be retained between the members 19 and the outer surface of the waterproof interlining 18. The waterproof characteristics of the sheet 18 will prevent any such moisture from penetrating into the interior of the box.

In Figure 5 is illustrated the water-tight joint formed between the top and bottom members 22 and the end members 16. The waterproof sheet 21 terminates, at its ends, in the straight par-

allel extensions 21b and the waterproof sheet 15 terminates in the extensions 15a bent at substantially right angles so that they lie in close contact with the extensions 21b. The same type of waterproof gasket 23, as that shown in Figure 4, fits over these two extensions and thereby provides a water-tight joint between the top and bottom members and the end members of the box.

In Figure 6 there is illustrated the water-tight joint formed between the side members 19 and the end member 16. As shown, the waterproof sheet 18 has straight extensions 18a and the waterproof sheet 15 has extensions 15a bent at substantially right angles; the gasket 23 fitting over both of these extensions and forming a waterproof joint between the joined members in the manner described above.

In Figure 7 there is illustrated in perspective the completed box ready for shipment. The nails 25 joining the end, side, top, and bottom members have been staggered to provide strength. The waterproof gaskets 23, it will be noted, extend the full length of the joined members. While it is not essential, I prefer to treat the entire outer surface of the box 10 with the same waterproofing composition that is used for impregnating the waterproof sheets 15, 18 and 21 and the waterproof gaskets 23 described above.

Although I have shown only one waterproof gasket along each joined edge of the box, it is to be understood that any greater number may be used. For example, if the initially separate panels 11, 12 and 13 have not been accurately cut, and as a result do not form a close fit at the joined edges, this can be easily overcome and the box rendered entirely waterproof by inserting several of the gaskets 23.

In Figure 8, I have shown a different type of waterproof gasket from that described above. The gasket in Figure 8 is formed not by means of a separate member, such as 23, supra, but by a folded extension of the waterproof interlining 21. This, of course, also applies to the interlining 15 shown in the preceding figures. The interlining 18 in Figure 8, has, as usual, straight extensions 18a and the interlining 21, as stated, has folded substantially U-shaped extensions 26. The extensions 26, in combination with extensions 18a provide efficient water-tight gaskets between the joined members 19 and 22. While I have shown only one fold for the extensions 26, it is to be understood that the gasket may be formed by folding the edge of the sheet 21 back upon itself several times to form a W-shaped member or any desired multiplications thereof. The latter would be desirable in the example mentioned above where the wooden members have not been accurately cut.

Any water that might seep in between the outer surfaces of the extension 26 and the adjacent surface of the members 19 and 22 would be prevented from entering the interior of the box, since the waterproof sheets 18 and 21 would retain such moisture between their outer surface and the inner surface of the members 19 and 22.

In Figure 9, I have illustrated still another type of waterproof gasket, which I believe will be useful in case the ends of the waterproof sheets, such as 21, have been accidentally damaged, that is, broken or torn. In such a case the U-shaped gasket 27 with its extension 28 could be inserted. The extension 28, as shown, would reinforce the torn portion 29 of the damaged lining 21 and thus effect a water-tight joint. It is also to be appreciated that this type of gasket 27 may be used entirely in place of the gasket 23, whenever desired.

It is to be understood that my invention is not limited to the specific illustrations or description given hereinbefore by way of example, but is susceptible to various modifications and changes, all of which come within the scope of the following claims.

What I claim as new is:

1. A waterproof box consisting of an inner marginal frame, a plurality of outside wooden members joined to said frame, a sheet of waterproof paper board interposed between said marginal frame and each of said outside members, some of said waterproof sheets having substantially straight edges and others having folded edges adapted to cover the straight edges of said other sheets and thereby form a water-tight gasket between each joined pair of said outside members.

2. A waterproof box consisting of an inner marginal frame, a plurality of boards forming the outside of said box and attached to said frame, a sheet of waterproof fiber board interposed between said marginal frame and each of said outside boards, some of said waterproof sheets having substantially straight parallel edges and others of said sheets having their edges folded to form a substantially U-shaped member adapted to cover said straight edges, thereby forming a water-tight joint.

3. A waterproof box comprising a plurality of panels joined together to form the top, bottom, and sides of the box, each of said panels having an outside member, an inner marginal frame, and a sheet of waterproof material interposed between said frame and said outside member, and the several waterproof sheets being overlapped along their contiguous edges to form a water-tight seal thereover such that any water tending to enter the box along these edges will be directed to and retained between said outside members and the outer surface of said waterproof sheets, whereby such water is prevented from reaching the interior of the box.

4. A waterproof box comprising a plurality of panels joined together to form the top, bottom, and sides of the box, each of said panels having an outside member, an inner marginal frame, and a sheet of waterproof fibrous material interposed between said frame and said outside member, and the several waterproof fibrous sheets being overlapped along their contiguous edges to form a water-tight seal thereover such that any water tending to enter the box along these edges will be directed to and retain between said outside members and the outer surface of said waterproof fibrous sheets, whereby such water is prevented from reaching the interior of the box.

5. A waterproof box comprising a plurality of panels joined together to form the top, bottom, and sides of the box, each of said panels having an outside member, an inner marginal frame, and a sheet of waterproof paper board interposed between said frame and said outside member, and the several waterproof paper board sheets being overlapped along their contiguous edges to form a water-tight seal thereover such that any water tending to enter the box along these edges will be directed to and retained between said outside members and the outer surface of said waterproof paper board sheets, whereby such water is

prevented from reaching the interior of the box.

6. A waterproof box comprising a plurality of panels joined together to form the top, bottom, and sides of the box, each of said panels having an outside member, an inner marginal frame, and a sheet of waterproof material interposed between said frame and said outside member, and a strip of said waterproof material folded over the contiguous edges of the adjacent waterproof sheets to form a water-tight seal over these edges such that any water tending to enter the box along these edges will be directed to and retained between said outside members and the outer surface of said waterproof sheets whereby such water is prevented from reaching the interior of the box.

7. A waterproof box comprising a plurality of panels joined together to form the top, bottom, and sides of the box, each of said panels having an outside member, an inner marginal frame, and a sheet of waterproof paper board interposed between said frame and said outside member, and a strip of said waterproof paper board folded over the contiguous edges of the adjacent waterproof paper board sheets to form a water-tight seal over these edges such that any water tending to enter the box along these edges will be directed to and retained between said outside members and the outer surface of said waterproof paper board sheets, whereby such water is prevented from reaching the interior of the box.

8. A waterproof container comprising top, bottom and sides connected together to form a closed container, sheets of waterproof material covering the inner surface of said top, bottom and sides, said sheets having contiguous portions extending between and held together by the joined edges of said top, bottom and sides, such that they form normally free edges with potential openings therebetween at the outside edge of said joined members, and folded waterproof sheet material positioned over and around said potential openings and located between the joined edges of said top, bottom and sides, such that no free edges susceptible to moisture penetration are exposed exteriorly of the container, whereby any moisture tending to enter the potential openings between said normally free edges and into the interior of the container is directed away from said free edges and retained in the space between the outer surface of said sheets of waterproof material and the inner surface of said top, bottom and sides.

THOMAS L. CUNNINGHAM.