Sept. 26, 1939. P. ZALKIND 2,173,871

COLLAPSIBLE INSULATING CASING

Filed April 20, 1936 4 Sheets-Sheet 1

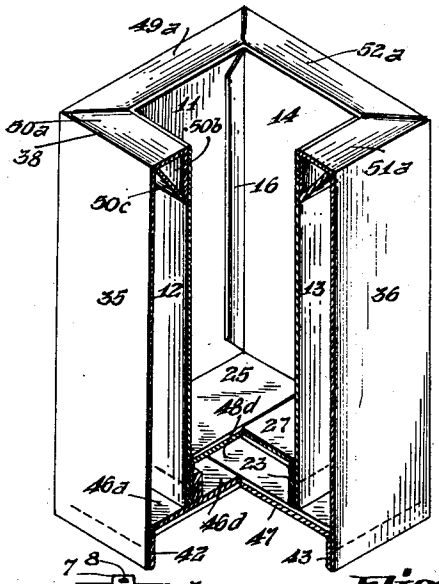


Fig: 1

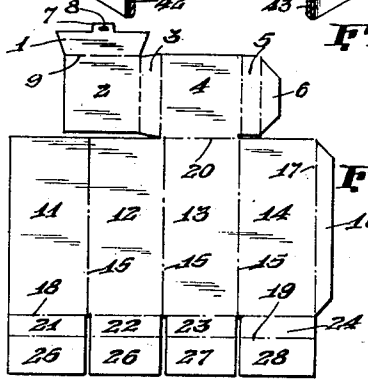


Fig: 3

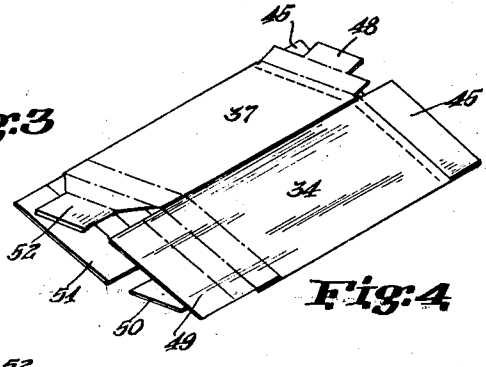


Fig: 4

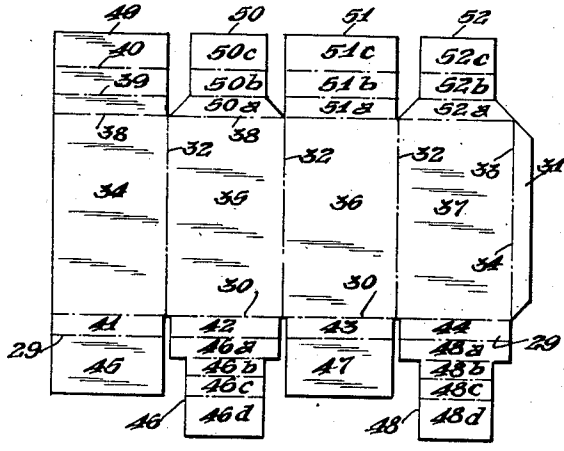


Fig: 2

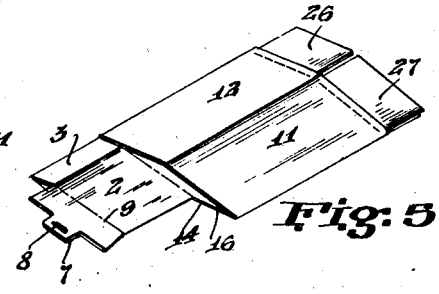


Fig: 5

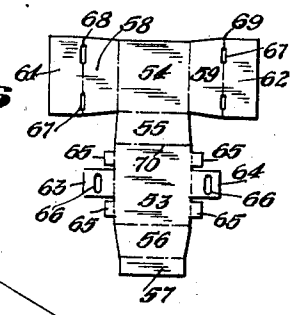


Fig: 6

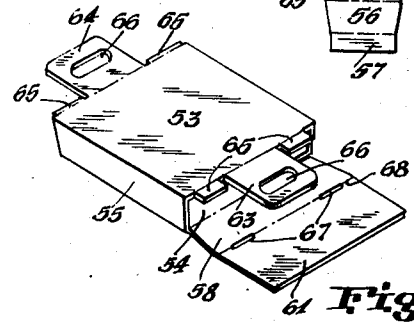


Fig: 7

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COLLAPSIBLE INSULATING CASING

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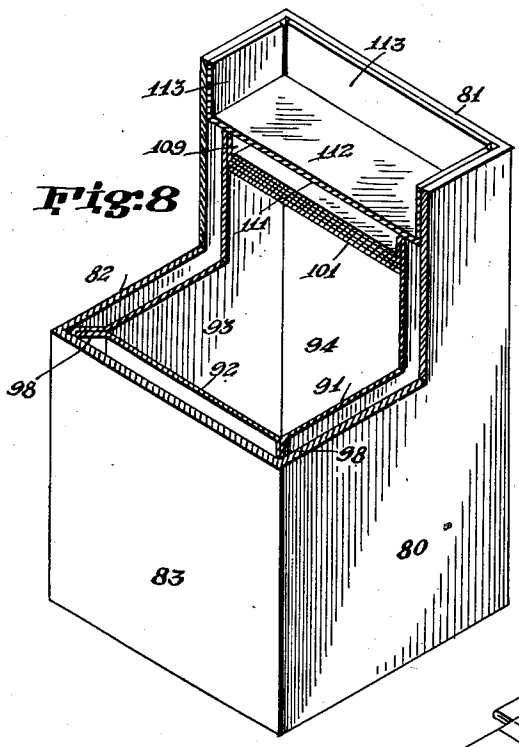


Fig:8

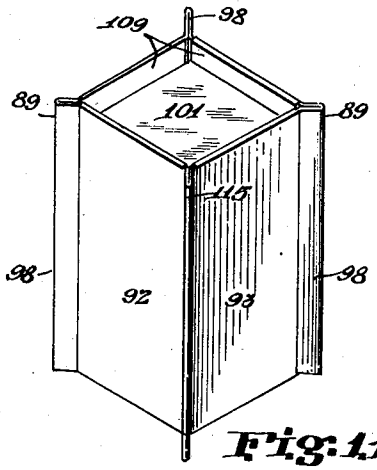


Fig:11

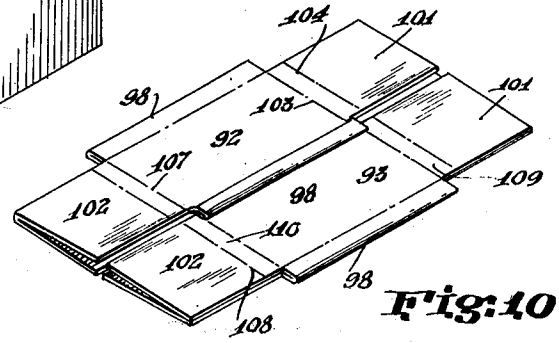


Fig:10

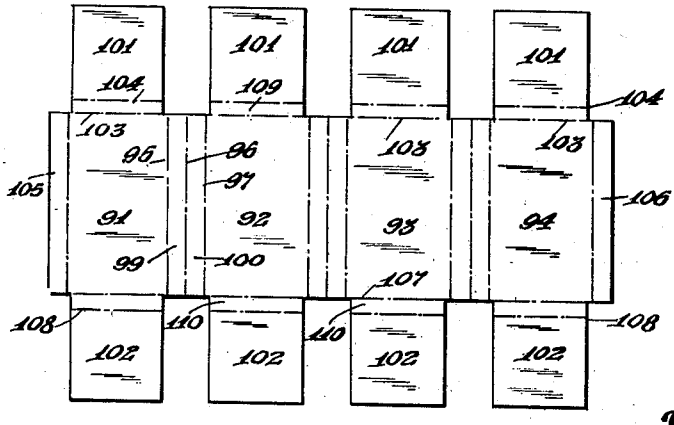


Fig:9

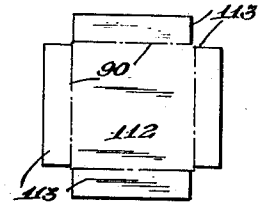


Fig:12

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COLLAPSIBLE INSULATING CASING

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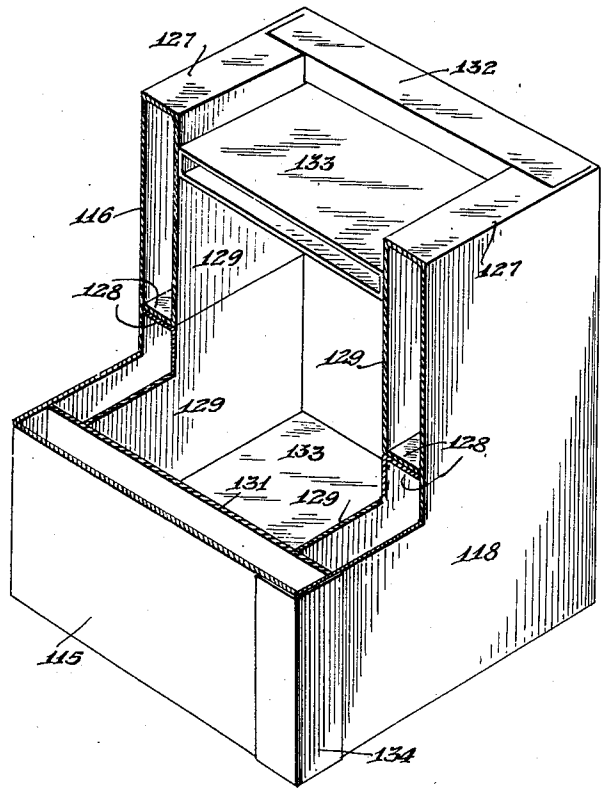


Fig: 13

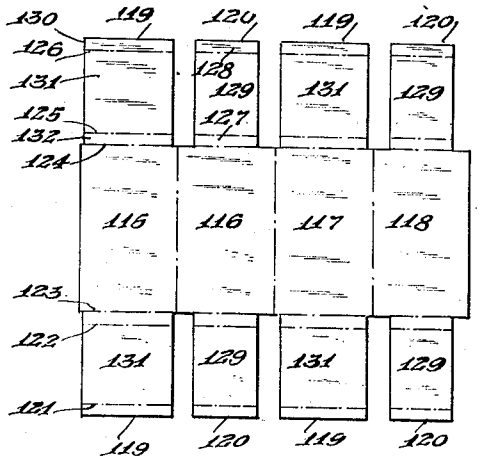


Fig: 14

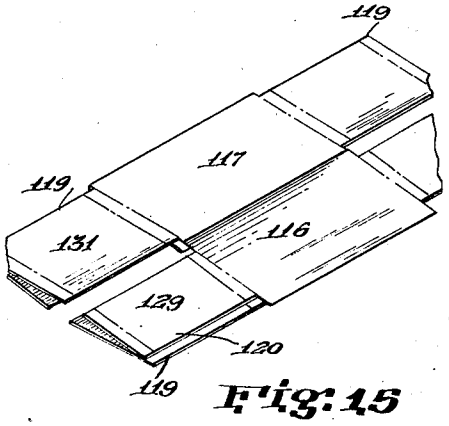


Fig: 15

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COLLAPSIBLE INSULATING CASING

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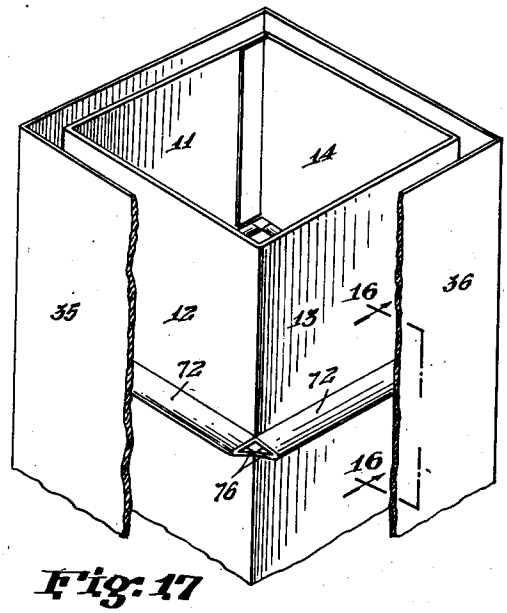


Fig: 17

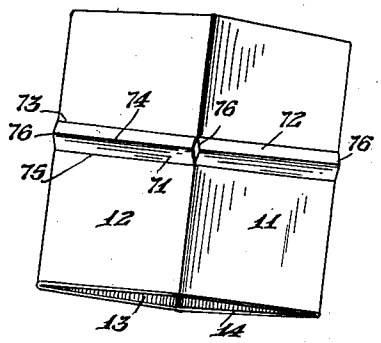


Fig: 18

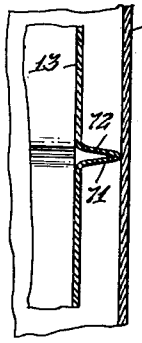


Fig: 16

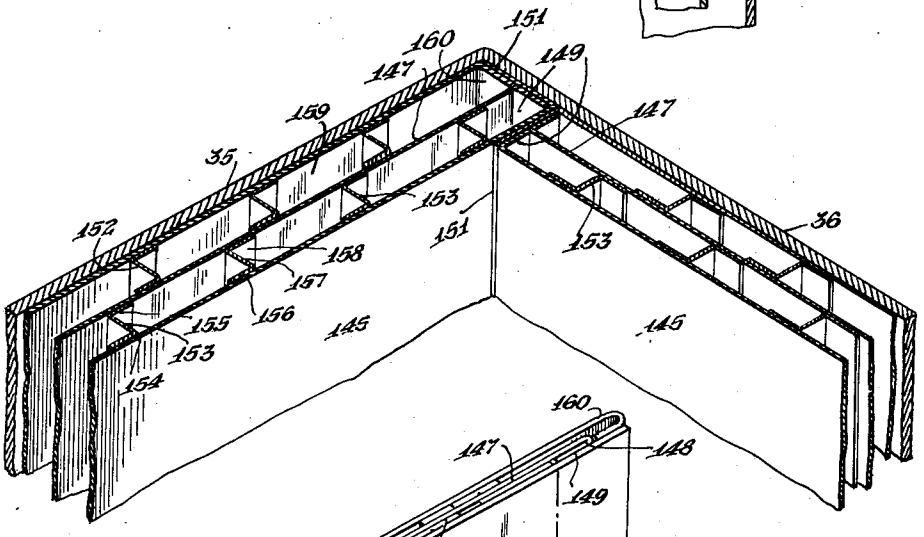


Fig: 20

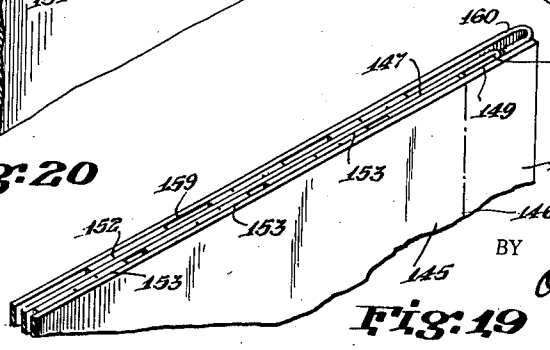


Fig: 19

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Patented Sept. 26, 1939 2,173,871

UNITED STATES PATENT OFFICE

2,173,871

COLLAPSIBLE INSULATING CASING

Philip Zalkind, New York, N. Y.

Application April 20, 1936, Serial No. 75,315

7 Claims. (Cl. 229—14)

My invention relates to novel heat insulated containers, and more particularly relates to folding or collapsible containers.

My invention comprises a container formed from blanks of sheet material, such as corrugated board, box board and the like, cut, scored and folded in a manner to provide a casing having hollow walls. These hollow walls provide dead air spaces which effectively insulate the container against the passage of heat. Thus, with my construction a container is provided which may be folded or collapsed, and at the same time is an efficient heat insulator. Such a container may be used for the storage of either hot or cold materials, which are to be maintained either hot or cold as the case may be. Thus my container is particularly adapted to the shipment of ice-cream and the like, but, I do not limit its use to this particular purpose. My container is inexpensive to construct. It may be stored in knock down condition and may be so delivered to the user. It therefore requires comparatively little space for storing, and cost of delivery will be relatively low. Moreover, where additional heat insulation is required, my container is adapted to receive filler members which provide such additional heat insulation. These members may be of any well known type, but, where such additional insulation is necessary, I prefer to use one of the types of insulating filler disclosed in my copending applications filed coincidently with this application and entitled Improvements in collapsible filler and improvements in insulation sheets.

The objects of my invention are thus to provide a container that may be collapsed or folded, that provides insulation against the passage of heat, that is, inexpensive to construct; and that is adapted to receive an insulating filler. There are other objects of my invention which will be apparent from the following detailed description in connection with the drawings, in which:

Figure 1 is a perspective view, partly cut away, showing one form of my novel container.

Figure 2 is a developed view of a blank for forming the outer shell of the casing of Figure 1.

Figure 3 is a developed view of a blank for forming the inner shell of the casing of Figure 2.

Figure 4 is a perspective view showing the outer shell from the blank of Figure 2 in a partly collapsed condition.

Figure 5 is a perspective view showing the inner shell made from the blank of Figure 3 in a partly collapsed condition.

Figure 6 is a developed view of one form of separate cover suitable for use with the container of Figure 1.

Figure 7 is a perspective view of the cover of Figure 6 partly set up for use.

Figure 8 is a perspective view, partly cut away, showing a modified form of my novel container.

Figure 9 is a developed view of a blank for forming the inner shell shown in Figure 8.

Figure 10 is a perspective view showing the shell of Figure 9 in a collapsed condition.

Figure 11 is a perspective view showing the inner shell of Figures 9 and 10 assembled for insertion into the outer shell as shown in Figure 8.

Figure 12 is a developed view of a blank for forming the cover shown in Figure 8.

Figure 13 is a perspective view, partly cut away, showing another modified form of my novel container in which both the inner and outer walls are formed from a single blank.

Figure 14 is a developed view showing the blank for forming the container of Figure 13.

Figure 15 is a perspective view showing the shell of Figure 13 in a collapsed condition.

Figure 16 is a cross-section on the plane 16—16 of Figure 17 showing a novel spacing member to aid in maintaining proper relative spacing between the inner and outer shell.

Figure 17 is a perspective view, partly broken away, showing the spacing member of Figure 16 applied to an inner shell inserted within an outer shell.

Figure 18 is a perspective view showing the inner shell of Figure 17 in a collapsed condition.

Figure 19 shows a form of collapsible insulating filler member which may be used with my novel casing.

Figure 20 is a perspective view showing a fragmentary portion of a corner of the container shown in Figure 17 with the insulated filler member, shown in Figure 19.

In the blank shown in Figure 3, four sections 11, 12, 13 and 14, separated by the score lines 15, form the sides of the inner shell of the container. At the bottom of the sections 11 to 14, two parallel score lines 18 and 19 form the sections 21 to 24 and 25 to 28. Tab 16 protrudes from one side of the section 14 and is separated from it by the score line 17. Portions 21 to 24 are adapted to be turned about the score lines 18 into a reentrant position so as to be parallel to and in contact with sections 11 to 14 respectively. In this position, the portions 21 to 24 may be secured to sections 11 to 14 by gluing, stitching, stapling or any other suitable means. The blank is then folded on score line 15 between sections 12 and 13; and sec-

tion 11 is attached to section 14 by securing flap 16 to the free edge of section 11 in any suitable manner. The blank is thus formed into a collapsed tube as shown in Figure 5.

The construction of the blank for the outer shell, as shown in Figure 2, is similar in many respects to the blank of Figure 3. It comprises the four main sections 34, 35, 36 and 37 separated from each other by the parallel score lines 32. Sections 34, 35, 36 and 37 of the blank of Figure 2 are of larger size than the corresponding sections 11, 12, 13 and 14 of the blank of Figure 3, in order that the two shells will fit each other in a manner to be described later. At the free edge of section 37 is the flap 31, separated from section 37 by the score line 33. At the top of sections 34, 35, 36 and 37 are the flaps 49, 50, 51 and 52, separated from the sections by the score line 38. Parallel with score line 38 are the score lines 39 and 40, dividing each of the flaps 49 to 52 into three sections. Thus, flap 50 is divided into the sections 50*a*, 50*b* and 50*c*. The other flaps are similarly divided. The flap sections 50*b* and 50*c*, and 52*b* and 52*c* are narrower than the other sections, being substantially the same width as two opposite wall sections of the inner shell previously described. At the bottom of the casing are the flaps 41, 42, 43 and 44, separated from their respective sections by the score line 30. These flaps are adapted to be turned about score line 30 into a reentrant position so as to be parallel to and in contact with sections 34 to 37 respectively. In this position the flaps 41 to 44 may be secured to their respective wall sections in any suitable manner as has been explained in connection with Figure 3. Flaps 41 and 43 respectively are provided with the flap extensions 45 and 47 forming a bottom wall of the outer casing. Flaps 42 and 44 respectively are provided with the flap extensions 46 and 48. The score line 29 separates these flap extensions from their respective flaps. Flap extension 46 is further separated by score lines into sections 46*a*, 46*b*, 46*c* and 46*d*. Flap extensions sections 46*a* and 48*a* are of substantially the same width as their respective panels 35 and 37; and their length is slightly longer than the distance between the inner and outer shell when the container is set up. The flap extensions sections 46*b*, 46*c* and 46*d* are somewhat narrower than corresponding inner wall sections. The corresponding sections of flap extension 48 are of similar width. Sections 46*b* and 46*c*, and the corresponding sections on extension 48, are somewhat shorter than sections 21 to 24 of the inner shell. Sections 46*b* and 46*c* may be folded on their score lines so as to lie in face to face relationship, and securely fastened to each other in any suitable manner. The similar sections on flap 48 may be similarly treated. Sections 46*a*, 46*d*, 48*a* and 48*d* fold into place to form a bottom lining for the outer shell. After folding the blank on score line 32 between sections 35 and 36, section 37 may be attached to section 34 by means of the tab 31, thus forming a tube which is shown in collapsed form in Figure 4.

In setting up my casing, the outer shell, just described, is opened until the sections 34 to 37 are at right angles to each other. Flaps 46 and 48 are then folded back at right angles to the side sections with the sections 46*b*, 46*c*, 48*b* and 48*c* forming a flange projecting upwardly into the open shell, as shown in Figure 1. Flaps 45 and 47 are then folded into position against flaps 46 and 48, and are joined to each other, preferably using a strip of pregummed paper tape. This completes the bottom of the outer shell, which will have a protruding, peripheral flange formed from the sections 41 to 44 co-operating with the ends of the adjacent side walls. In setting up the top, flaps 49 and 51 are first folded on their score lines, after which flaps 50 and 52 are so folded. In this position the flap sections 49*a*, 50*a*, 51*a* and 52*a* lie in a plane perpendicular to the side walls. Flap sections 49*b*, 50*b*, 51*b* and 52*b* lie perpendicular to this plane and parallel to the side walls. Flap sections 49*c*, 50*c*, 51*c* and 52*c* are of such a length as to complete the hypothenuse of the right triangle formed by the flaps described just above. Thus, any pressure to the flap portions which are parallel to the side wall is transmitted by these diagonal flap sections back to the corner edge of the casing formed at the score line 38. The inner faces of flap sections 49*b*—52*b* form a short rectangular tube having inside dimensions substantially equal to the outer dimensions of the inner shell.

In setting up the inner shell the collapsed tube shown in Figure 5 is expanded until the side walls 11 to 14 are at right angles to each other. Flaps 25 and 27 are then folded back at right angles to the side sections, and flaps 26 and 28 are then folded into position against flaps 25 and 27. The bottom may then be secured in any suitable manner, as, for instance, with pregummed paper tape. Sections 21 to 24 co-operating with wall sections 11 to 14 form a downwardly protruding flange extending about the periphery of the shell.

The expanded inner shell is inserted within the expanded outer shell, the inner shell being of such dimensions as to fit snugly within the short tube formed by sections 49*b*—52*b* formed in the outer casing as has been described. The inner tube is of such length that, with the edge of its peripheral flange resting upon the end wall of the outer shell, the upper end of the inner tube will terminate substantially at the top of the outer casing. In this position the upstanding flanges formed in the bottom of the outer shell fit within the space formed by the peripheral flange on the inner shell. These flanges on the outer shell may be so spaced that each will be adjacent to an inner tube flange, and they are preferably of such length that their ends will adjoin the other two flanges of the inner shell. The inner shell is thus spaced within the outer shell, the top being held in position by the short tube formed by the flaps at the top of the outer shell, and the bottom being held in position by the interlocking flanges just described. A "dead" air space is thus formed between the inner and outer shell around the sides of the container and a separate "dead" air space is provided at the bottom of the container. The desired thickness of the side wall "dead" air space determines the relative dimensions of the side walls of the inner and outer tube. A large "dead" air space requires that the outer tube be increased in dimensions relative to the inner tube. The thickness of the bottom "dead" air space determines the height of the peripheral flanges on the bottom end of the inner tubing. The thickness of the "dead" air space may, of course, be chosen at any desired value depending upon the particular application. In general, it will not be less than ¼'' nor more than 3''. I have found that where no additional insulating filler is used with my casing, a "dead" air space about ½'' in thickness provides an efficient heat insulation.

In order to close the upper end of the container, to prevent longitudinal relative movement of the inner and the outer shells, and to provide heat insulation on the upper end of the casing, I provide a plug type of closure. This closure is preferably a hollow panel somewhat similar to the panels which I disclose in my copending applications Ser. No. 45,708, filed October 10, 1935, and Ser. No. 739,962, filed August 15, 1934.

This plug type closure may be formed integrally with inner casing, or it may be formed from a separate blank of sheet material. In Figures 3 and 5 I have shown an inner tubing with an integral closure member. If a separate closure member is used, the blank of Figure 3 would terminate at the line **20**. In Figures 6 and 7 I have shown one form of separate closure. Both the hollow closure shown in Figures 3 and 5, and the hollow closure shown in Figures 6 and 7 are collapsible as will be explained.

Referring again to Figure 3, the closure member comprises the panels and flaps **1** to **6** inclusive, joined to each other by suitable score lines. Panel **4** which is shown joined to the main blank by the score line **20** forms the top of the closure, and panel **2** forms the bottom of the hollow closure member. Panels **3** and **5** form side walls, a glue flap is represented at **6**, a folding flap is shown at **1**, and tab **7** is provided as a handle. Panel **4** is made slightly larger than the inside dimension of the inner tube, and panel **2** is made slightly smaller than the inside dimension of the inner tube. Panels **3** and **5** constitute the side wall, and panel **1** the end wall of the closure. The panels **2** and **3** are bent over as a unit, and the edge of panel **2** is united to panel **5** by means of the gluing flap **6**, thus forming the collapsed tube shown in Figure 5. In using this type of closure, the collapsed plug is expanded after the inner tube has been placed within the outer casing, as has been described. The panel **1** is then bent on the score line **9** in a manner that the hand tab **7** projects above the top panel **4** with the handle hole **8** exposed above the closure. In this position the plug closure is forced into the opening at the top of the inner tube until the panel **4** is flushed with the top of the inner tube. This wedges the inner tube against the short tube formed at the top of the outer casing. In this manner the inner tube and the outer tube are held in position relative to the outer tube. At the same time the space between the panels **2** and **4** forms an insulating "dead" air space. The handle hole **8** extending above the top of the cabinet provides means for removing the closure when desired.

As has previously been explained, the closure member may be formed separately from the inner casing. A blank for such a closure is shown in Figure 6, in which **53** represents the top panel, **54** represents the bottom panel, **55** and **56** represent side walls, **58** and **59** represent end walls, **57** represents a glue flap, **61** and **62** represent end wall flaps, **63** and **64** represent handle tabs each with the handle slots **66**, and **65** represents locking tabs, all connected in an integral blank provided with suitable score lines. Adjacent to score line **68** defining the common boundary of panel **58** and flap **61**, and to the score line **69** defining the common boundary of panel **59** and flap **62** are the slots **67** so spaced and proportioned as to receive tabs **65** when the plug is folded into set up position. The top panel **53** is somewhat larger than the inside dimensions of the inner tube of the casing, and bottom panel **54** is somewhat smaller than the outside dimensions of the inner tube, in the same manner as has been described in connection with the integral closure of Figure 3. The blank is folded on score line **70** and formed into a collapsed tube with flap extensions by gluing panel **56** to panel **54** through the agency of the glue flap **57**.

In setting up the plug for use, the tube is first expanded by bending on the proper score lines. Each end panel is then bent upward and the end flap is inserted within the tube. Tabs **65** are then inserted into slots **67**. In Figure 7 the closure plug is shown with one end wall folded into place and the other ready to be folded. When the closure is folded into position, the handle plugs **63** and **64** form ears protruding outwardly from the top panel of the closure. The closure may be inserted within the inner casing in the manner previously explained in connection with the closure of Figure 3. When the separable closure just described has been forced into position in the casing, the handle tabs **64** and **65** lie over and parallel to the top face of the casing and are substantially in contact therewith, thus forming a compact means of withdrawing the plug from the casing.

Where it is desired that the casing after use be returned for reuse, this may be readily accomplished with the casing in collapsed condition. In such case it is merely necessary to remove or slit the paper tape used for uniting the several portions of the bottoms of the inner and outer casings, after which the various flaps may be folded into the positions shown in Figures 4 and 5, and the casing may be collapsed as shown in these two figures. Where desired the collapsed tube of Figure 5 will lie within the collapsed tube shown in Figure 6. This will, however, cause the tube of Figure 6 to remain somewhat open.

In Figures 8 to 12 I have shown a modified form of my insulated container. In this modification the outer casing comprises a plain rectangular tube which may be made from an integral rectangular blank of sheet material having parallel score lines which divide the blank into the four side wall members of the tube, such as members **80**, **81**, **82** and **83** of Figure 8. The tube is preferably formed by uniting the outside edges of the blank by means of tape provided with an adhesive coating which overlaps both of the end panels of the blank. However, an additional flap may be provided for making a lap joint; or the tube may be joined on the face of a side member rather than at a corner of the tube.

A suitable blank for the inner shell is shown in Figure 9. The blank shown in this figure comprises four side walls **91** to **94**, each separated by a series of parallel score lines, as, for example, **95**, **96** and **97**, thus providing two narrow panels, as, for instance, **99** and **100** extending between each two main panels. When the blank is assembled the two narrow panels of each pair lie in face to face relationship with each other and may be united with each other in a suitable manner, as, for instance, by the use of an adhesive substance. Each pair of narrow panels so united forms a spacing member **98**, which is clearly shown in Figures 8, 10 and 11.

Protruding from each of the side wall sections at the top and bottom thereof are end wall closure sections **101** and **102** separated from their individual side wall sections by the score lines **103** and **104**, and **107** and **108**. Extending from the end wall sections **91** and **94** are the tabs **105** and **106**. These tabs are used in forming the blank

into a tube, the tabs 105 and 106 being placed in face to face relationship with each other, and joined to each other in any suitable manner, as, for instance, by gluing. In this manner an additional spacer member 98 is formed in addition to those formed by the pairs of narrow panels between the main panels, as I have previously described. A collapsed tube thus formed is shown in Figure 10.

To assemble the shell from the collapsed tube, the side walls 91 to 94 are turned on their score lines until the side walls are in proper angular relationship to each other. For a rectangular casing, of course, each wall should be at a right angle to its adjoining wall. When the tube has been expanded into proper position, as described above, the end sections 101 are turned about their score lines 103 and 104 until the narrow sections 109 between the score lines 103 and 104 are in face to face relationship with their corresponding side wall sections 91 to 94. The sections 101 are then further turned about their score lines 104 until they are at right angles to the side wall sections to form the top end closure for the inner shell. The bottom sections 102 may then be folded on score lines 107 and 108 in a similar manner to that described above for the top end. That is, the bottom end flaps are folded until the narrow panels 110 between the score lines 107 and 108 are in face to face relationship to their respective side walls 91 to 94, and the end sections 102 are then folded to be perpendicular to the side walls. The narrow panels 109, in conjunction with the top edge of their respective side walls, form a peripheral outstanding flange at the top edge of the shell, as is clearly shown in Figure 11, which shows an expanded and assembled inner shell as viewed from the top. A similar peripheral flange is formed by the panels 110 at the bottom of the shell.

To complete the insulated casing the inner shell is placed within the outer shell, as is shown in Figure 8, the space flanges 98 at the corners of the inner shell fitting snugly within inner corners of the outer shell. Pan shaped closures 111 are then applied to the upper and lower end of the outer casing.

A blank for such a suitable end closure is shown in Figure 12. It comprises merely a main section 112 with four side flaps as at 113 and separated from the main section by the score lines 90. The member 111 formed by bending the flaps 113 on the score lines 90 is proportioned to fit snugly within the outer shell of the casing. It can be seen that this casing may be easily assembled and may be easily recollapsed for reshipment after use.

When the shell is assembled as described above, six separated "dead" air spaces are provided for insulating the container. Thus, a single side wall panel of the inner shell, the two spacing members 98 at each side of the panel, the corresponding side wall of the outer shell, and a section of each of the pan-shaped closure member form a "dead" air space isolated from the other spaces between the two shells; and each of the four walls is thus provided with its isolated air space. At each end of the container an isolated "dead" air space is provided by the pan-shaped member abutting the outstanding peripheral flange formed on the closure of the inner shell. It will be, of course, understood that, by properly proportioning the various flanges and panels, the thickness of the "dead" air space may be adjusted to any desired value depending upon the particular application, as has been explained in conjunction with Figures 1 to 7.

It will be noted that the inner casing just described may be used with the outer casing shown in Figures 1, 2 and 4. In this event, the top ends of the flanges 98 may be removed, as shown at 89 in Figure 11, so as to match the hollow reinforcement around the top edge of the outer shell of Figures 1, 2 and 4. Where this outer shell is used with the inner shell shown in Figure 11, the bottom end closure on the outer shell may be provided in the outer shell blank, and the top end closure may be a hollow plug member, such as is shown in Figure 7, and designed to fit within the outstanding flange provided by the top closure of the shell of Figure 11. It will be further understood that various other combinations may be used, as, for instance, the inner shell shown in Figure 11 may be used with an outer shell having a bottom end closure, as shown in Figure 1 and a top end closure, as shown in Figure 8.

While I have shown my casing to be rectangular in cross-section, it may be hexagonal or octagonal just as readily, by providing the proper number of side wall panels, and the tube so formed may be collapsed in the same manner, as is shown in Figure 10 for the rectangular tube. Thus, for a hexagonal casing the blank of Figure 9 will have six main panels, such as panels 91, and the closure panels 101 and 102 will be hexagonal. It is not necessary to provide a closure panel, such as panel 101 or 102 for each side wall, either with a rectangular casing or one of a greater number of sides. However, where a lesser number of full flaps are provided on each end than there are sides to the casing, I prefer that the narrow panels, such as 109 and 110, be provided on the blank; and that on those sides where the closure flap is omitted, the narrow panel be secured to the side panel in a suitable manner.

A further modification of my invention is shown in Figures 13, 14 and 15. In this modification both the inner and outer shells which form the "dead" air space for insulation are constructed from a single, integral blank of sheet material.

As is shown in Figure 14, the blank comprises four main sections 115 to 118, forming four outer side walls of a container. Each of these sections have individual tongues 119 and 120 extending from the top and bottom of the sections. Tongues 119 extend for substantially the full width of the panel to which it is attached, while tongues 120 are somewhat narrower than the panel for the purpose, as will appear later. Parallel score lines 123 and 124 divide the main panels from the tongues. Further parallel score lines 121, 122, 125 and 126 divide tongues 120 into panels 127, 128 and 129; and tongues 119 into panels 130, 131 and 132.

In assembling the blank sections 117 and 118 are folded over sections 115 and 116. In this manner the edge of section 118 will coincide with the edge of section 115, and the tape 134 (see Figure 13) is applied to unite the free edges into a collapsed tube as shown in Figure 15.

In setting up this tube, the side members 115 to 118 are turned on their score lines until these panels are in right angular relationship to each other. Tongues 119 at the upper end of the casing are then turned on the score line 124 until the portions 132 are at right angles to the side walls. Portions 130 are then turned about score line 126 until they are perpendicular to the por-

tions 131. The portions 131 are then turned about score line 125 until it is parallel to the side wall member to which it is secured through the portion 132. In this position, with the portions 130 and 132 perpendicular to the side wall and the portions 131 parallel to the side wall, the free edge of portions 130 comes into contact with the side wall. Tongues 120 on the upper end of the casing are then folded into position in a similar manner. The width of tongues 120 is such that they will fit snugly between the two parallel of the tongues 131 which have previously been folded into position. The tongues on the lower end of the casing are then folded in a similar manner to that just described for the upper end of the casing. The length of each of the tongue portions 129 and 131 is substantially one-half the length of the panels 115 to 118. In this manner, when the tongues are folded into position in the manner described above, tongue portions 128 and 130 on the upper end of the casing will lie in face to face relationship with similar portions on the lower end of the casing, as is clearly shown in the cut away portion of Figure 13. It will be understood that the tongues on the upper end of the casing need not be of the same length as the tongues on the lower end of the casing; but, if the portions 129 and 131 on the lower end of the casing are increased in length beyond one-half the length of the main panels, the corresponding section on the upper end should be correspondingly decreased, and vice versa.

With a casing folded in the manner just described, each side wall will be provided with two independent "dead" air spaces. Thus, eight independent "dead" air insulating spaces will be provided in the four side walls. The container parts may be locked in place and closure means provided on each end by the hollow closure pieces 133, each of which contain a "dead" air space, thus providing ten independent "dead" air insulating spaces surrounding the interior volume of the container. Closure pieces 133 may be of the type shown in detail in Figures 6 and 7.

In the containers which I have so far described, each inner casing and outer casing are constructed in pairs, and dimensions of either one cannot be changed without changing the relative dimensions of the two shells, except that in Figure 1 the outer shell could be increased in length a slight amount without changing the dimensions of the inner shell. In this event, the top edge of inner shell would meet the outer shell on a same line below the top of the short tube formed along the top of the outer shell. In this manner several lengths of containers may be constructed, using a single length of inner shell. The ability to use a single inner shell member for several sizes of containers has advantages from the point of view of both the manufacturer and user. In Figures 16, 17 and 18, I show how the inner shell may be modified so that a single length inner shell may be used with several lengths of outer casings.

Figure 11 shows the tubular portion of a collapsed inner shell similar, for instance, to the inner shell shown in Figure 5. For the sake of simplicity the various end closure flaps have been omitted, and only the panels comprising the side walls of the tube have been shown. Each of these side walls is provided with three parallel score lines 73, 74 and 75 as shown, the score line 74 being centrally located between the score lines 73 and 75. All three of the score lines extend completely around the four sections 11, 12, 13 and 14 of the tube. I prefer that the central score line 74 be formed from the interior of the tube, and the outer score lines 73 and 75 be formed from the exterior of the tube. At each of the corners where one of the side panels meets its adjacent side panel, the material of the tube is provided with the slit 76 extending along the line of junction of the two panels for the entire distance between the two parallel score lines 73 and 75. These slots permit the section 72 between the score lines 73 and 74, and the section 71 between the score lines 74 and 75 on each of the side wall panels to be bellowed outwardly, as shown in Figure 18, forming a spacer means between the outer shell and inner shell, as shown in Figure 18 and cross-section of Figure 16. The score lines 73, 74 and 75 and the slits 76 are preferably applied to the blank before it is folded and joined into a collapsed tube. Also, I prefer that the sheet be folded on score lines 73, 74 and 75 to form the bellows in the proper direction. After so forming the bellows a slight permanent deflection and strain will remain in the sheet so that the bellows may easily again be formed when desired, and they will always thereafter push out naturally on the proper side of the sheet. The assembly of this device will now be quite obvious. After the outer and inner shells have been suitably assembled, the inner shell is inserted in the outer shell, as shown in Figure 18. Pressure applied downwardly from the top of the inner shell causes the sections 71 and 72 to bulge or bellow outwardly forming the space determining means between the inner and outer shell. It will be understood that while I have shown the bellows length adjusting means in connection with the inner tube of Figures 1 and 5, it may be used with other modifications of my invention. Moreover, while I have shown in Figures 16, 17 and 18 only a single bellows element in the height of each side wall member, it will be readily understood that I may with equal facility use two or more of such bellows members on each side wall, and thereby attain a further gain in height adjustment besides cutting the side wall air spaces into smaller sections, and thus obtaining better heat insulating properties.

Where higher insulating value is required than is readily obtainable with a single insulating air space protecting any area of the container against transfer of heat to or from the container, I may provide additional heat insulating means between the inner and outer shell. In my copending application entitled improvements in Insulation sheets and filed coincidently with this application, I have shown a non-collapsible type of heat insulating filler; and in my copending application entitled improvements in Collapsible filler and also filed coincidently with this application, I have shown a collapsible type of heat insulating filler. Either of these types of fillers are adapted to be inserted between the inner and outer shells of the casings which I have disclosed in the present application; and fillers of these types provide a plurality of air spaces in series to the passage of heat perpendicular to the wall of the container. By way of illustration I show in Figure 19 one form of collapsible filler; and in Figure 20 I show how this type of filler may be expanded and inserted within the walls of the outer casing, as, for instance, walls 35 and 36 of the casing of Figure 1.

As illustrated in Figure 19, a blank 145 scored near its end as at 146 has secured thereto a second blank 147 near its end as at 148 with

the portion 149 in face to face relationship with the blank 145 and suitably secured thereto as by glue. When the section 145 is turned on its score line 146 the end portion 151 forms a spacer between the blank 145, and the wall member of any container against which the section 151 is brought into engagement, as, for instance, wall 35 of the container shown in Figure 20. At the same time the blank 147 in turn forms a "dead" air space, the thickness of which is determined by the width of the section 149, as is clearly shown in Figure 20. In order to further rigidly space blank 145 and blank 147, a plurality of sectional spacing members 153, each having two parallel score lines 154 and 155 forming the sections 156, 157 and 158, are interposed between the sections 145 and 147. Section 156, in face to face relationship with the blank 145, is suitably secured thereto as by glue; and similarly section 158, in face to face relationship with the blank 147, is suitably secured thereto as by glue. Each of the corresponding members 153 are similarly constructed. A third blank member 159 may be affixed by its end portion 160 to the end portion 151 of blank 145 in the same manner as blank 147 is affixed by its end portions 149. Spacing members 152 may be fixed to blanks 147 and 159 in the same manner as spacing members 153 are fixed between blanks 145 and 147. With this construction the entire insulating filler may be collapsed for shipment.

To be assembled into any container, such as that formed by walls 35 and 36, Figure 20, it is merely necessary to turn the blanks on their score lines until the edge of section 151 engages wall 35 and section 151 is in face to face relationship with wall 36. As will be clear from Figure 20, when the normally collapsed members of Figure 19 are turned into assembled form of Figure 20, the spacers 153 and 153 form a substantial Z, which not only add to the rigidity of the construction, but further cut the air spaces into smaller sections and thereby inhibit local interior convection currents.

It will readily be understood that the filler member may be made with spacer dimensions and thicknesses of air spaces to fit the particular application to which it is applied. It will also be understood that by providing additional blanks on the filler member, the number of air spaces in series may be increased from two, as shown in Figure 20, to any number which may suit the particular case.

If desired, a dehumidifier may be used in the space between the shells activated for absorbing moisture to increase the efficiency of the insulations. Such a dehumidifier may be activated carbon or silica gel, etc.

It will be understood that many changes may be made in my insulating casing, and that the particular modifications described are shown by way of illustration only, and are not intended to limit my invention within the meaning of the appended claims. Now having described my invention in a manner that it may be readily understood by one skilled in the art, I claim:

1. A collapsible insulating casing comprising an outer shell of fibrous sheet material having a plurality of side walls and a bottom wall united with each other along predetermined fold lines about which said side walls may be manually turned to callapse or expand said outer shell; an inner shell of fibrous sheet material having a plurality of side walls and a bottom wall united with each other along predetermined fold lines about which said walls may be manually turned to callapse said inner shell; and folds in the sheet material of said shells for maintaining said inner and outer shells in predetermined spaced relationship relative to each other, whereby insulating air spaces are provided on the side walls of said casing; said folds on the bottom walls of the inner and outer shells extending in a plane vertical to the bottom wall and cooperating with each other to maintain spaced relation.

2. A collapsible insulating casing comprising an outer shell of fibrous sheet material having a plurality of side walls and a bottom wall united with each other along predetermined fold lines about which said side walls may be manually turned to callapse or expand said outer shell; an inner shell of fibrous sheet material having a plurality of side walls and a bottom wall united with each other along predetermined fold lines about which said walls may be manually turned to collapse said inner shell; folds in the sheet material of said shells for maintaining said inner and outer shells in predetermined spaced relationship relative to each other, whereby insulating air spaces are provided on the side walls of said casing; said folds on the bottom walls of the inner and outer shells extending in a plane vertical to the bottom wall and cooperating with each other to maintain spaced relation; and an end wall comprising an inner and an outer panel with an intervening air space.

3. A collapsible casing formed from an integral blank of sheet material comprising an outer shell member, and an integral blank of sheet material comprising an inner sheet member, said blank for said outer shell member being scored to define side walls, flaps for a bottom wall with upwardly protruding flanges, and top flaps for forming a hollow reinforcing rim around the upper edge of said outer shell; said blank for said inner shell member being scored to define side walls, and flaps for a bottom wall having downwardly projecting peripheral flanges; said downwardly projecting flanges on said inner shell acting as spacing means for maintaining the bottom panel of said inner shell in predetermined spaced relationship with the bottom panel of said outer shell, and acting in co-operation with said bottom panels to enclose a "dead" air space for insulating the bottom of said casing; said downwardly projecting flange on said inner shell co-operating with said upwardly projecting flange on said outer shell for maintaining the lower end of the side walls of said inner shell in predetermined spaced relationship with the lower end of said outer shell, and said reinforcing rim co-operating with the upper end of said inner shell to maintain the upper end of the side walls of the inner and outer shells in predetermined spaced relationship to each other, thereby forming an insulating "dead" air space peripheral of said casing.

4. A collapsible casing formed from an integral blank of sheet material comprising an outer shell member, and an integral blank of sheet material comprising an inner sheet member, said blank for said outer shell member being scored to define side walls, flaps for a bottom wall with upwardly protruding flanges, and top flaps for forming a hollow reinforcing rim around the upper edge of said outer shell; said blank for said inner shell member being scored to define side walls, and flaps for a bottom wall having downwardly projecting peripheral flanges; said downwardly projecting flanges on said inner shell acting as spac-

ing means for maintaining the bottom panel of said inner shell in predetermined spaced relationship with the bottom panel of said outer shell, and acting in co-operation with said bottom panels to enclose a "dead" air space for insulating the bottom of said casing; said downwardly projecting flange on said inner shell co-operating with said upwardly projecting flange on said outer shell for maintaining the lower end of the side walls of said inner shell in predetermined spaced relationship with the lower end of said outer shell, and said reinforcing rim co-operating with the upper end of said inner shell to maintain the upper end of the side walls of the inner and outer shell in predetermined spaced relationship to each other, thereby forming an insulating "dead" air space peripheral of said casing; said inner shell being adapted to be withdrawn from said outer shell, and to be collapsed upon unfolding of said top and bottom flaps.

5. A collapsible casing formed from an integral blank of sheet material comprising an outer shell member, and an integral blank of sheet material comprising an inner sheet member, said blank for said outer shell member being scored to define side walls, flaps for a bottom wall with upwardly protruding flanges, and top flaps for forming a hollow reinforcing rim around the upper edge of said outer shell; said blank for said inner shell member being scored to define side walls, and flaps for a bottom wall having downwardly projecting peripheral flanges; said downwardly projecting flanges on said inner shell acting as spacing means for maintaining the bottom panel of said inner shell in predetermined spaced relationship with the bottom panel of said outer shell, and acting in co-operation with said bottom panels to enclose a "dead" air space for insulating the bottom of said casing; said downwardly projecting flange on said inner shell co-operating with said upwardly projecting flange on said outer shell for maintaining the lower end of the side walls of said inner shell in predetermined spaced relationship with the lower end of said outer shell, and said reinforcing rim co-operating with the upper end of said inner shell to maintain the upper end of the side walls of the inner and outer shells in predetermined spaced relationship to each other, thereby forming an insulating "dead" air space peripheral of said casing; and a hollow panel of sheet material forming a closure member for the open top end of said casing, and providing a "dead" air insulating space therefor.

6. A collapsible casing formed from an integral blank of sheet material comprising an outer shell member, and an integral blank of sheet material comprising an inner sheet member, said blank for said outer shell member being scored to define side walls, flaps for a bottom wall with upwardly protruding flanges, and top flaps for forming a hollow reinforcing rim around the upper edge of said outer shell; said blank for said inner shell member being scored to define side walls, and flaps for a bottom wall having downwardly projecting peripheral flanges; said downwardly projecting flanges on said inner shell acting as spacing means for maintaining the bottom panel of said inner shell in predetermined spaced relationship with the bottom panel of said outer shell, and acting in co-operation with said bottom panels to enclose a "dead" air space for insulating the bottom of said casing; said downwardly projecting flange on said inner shell co-operating with said upwardly projecting flange on said outer shell for maintaining the lower end of the side walls of said inner shell in predetermined spaced relationship with the lower end of said outer shell, and said reinforcing rim co-operating with the upper end of said inner shell to maintain the upper end of the side walls of the inner and outer shells in predetermined spaced relationship to each other, thereby forming an insulating "dead" air space peripheral of said casing; and a hollow panel of sheet material integral with said blank comprising said inner member, forming a closure member for the open top end of said casing, and providing a "dead" air insulating space therefor.

7. A collapsible casing formed from an integral blank of sheet material comprising an outer shell member, and an integral blank of sheet material comprising an inner sheet member, said blank for said outer shell member being scored to define side walls, flaps for a bottom wall with upwardly protruding flanges, and top flaps for forming a hollow reinforcing rim around the upper edge of said outer shell; said blank for said inner shell member being scored to define side walls, and flaps for a bottom wall having downwardly projecting peripheral flanges; said downwardly projecting flanges on said inner shell acting as spacing means for maintaining the bottom panel of said inner shell in predetermined spaced relationship with the bottom panel of said outer shell, and acting in co-operation with said bottom panels to enclose a "dead" air space for insulating the bottom of said casing; said downwardly projecting flange on said inner shell co-operating with said upwardly projecting flange on said outer shell for maintaining the lower end of the side walls of said inner shell in predetermined spaced relationship with the lower end of said outer shell, and said reinforcing rim co-operating with the upper end of said inner shell to maintain the upper end of the side walls of the inner and outer shells in predetermined spaced relationship to each other, thereby forming an insulating "dead" air space peripheral of said casing; said inner shell having also an expandable bellows formation acting to adjust the length of said inner shell walls to correspond to said outer shell walls, and further acting to maintain the intermediate portions of said inner and outer walls in spaced relationship relative to each other.

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