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PORTABLE COOLER WITH UNIVERSAL SUSPENSION  
ASSEMBLY FOR REFRIGERATION UNIT  
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3,109,299

Fig. 1

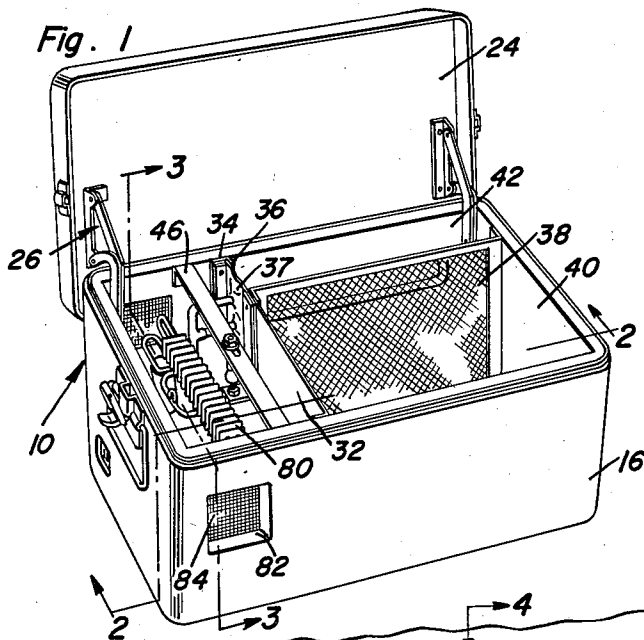


Fig. 4

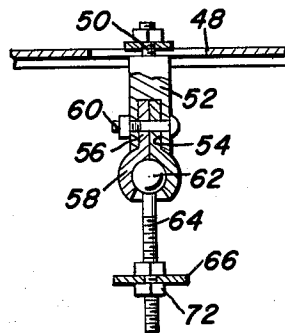


Fig. 2

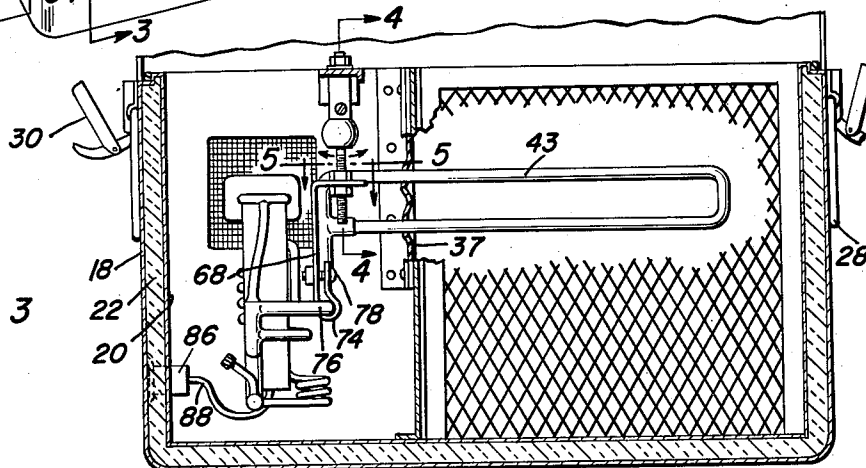


Fig. 3

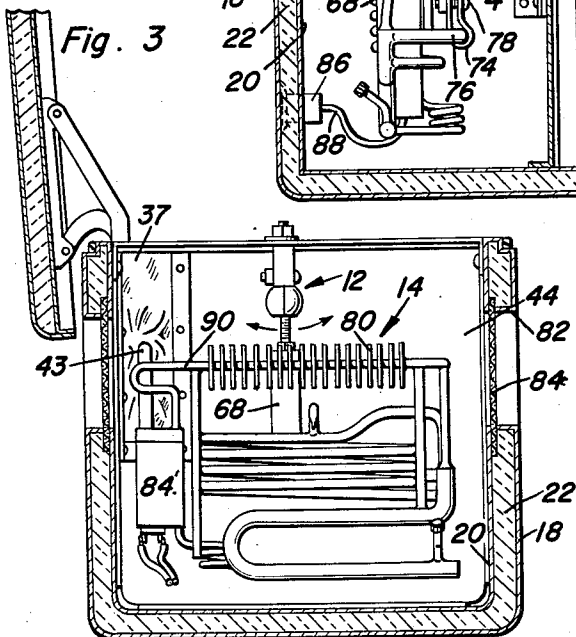
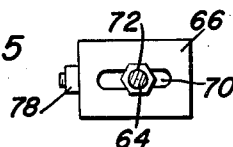


Fig. 5



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## 3,109,299 PORTABLE COOLER WITH UNIVERSAL SUSPENSION ASSEMBLY FOR REFRIGERATION UNIT

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9 Claims. (Cl. 62-448)

The present invention generally relates to a portable cooler or refrigerator having a novel suspension assembly for all of the components of the refrigeration unit whereby the refrigeration unit may be oriented in substantially constant relationship to the true vertical.

There have previously been provided portable coolers or refrigerators operated by employing an electric motor to drive a compressor, pump or the like. However, said devices are quite heavy even though they are still portable. Accordingly, it is the primary object of the present invention to provide a portable refrigeration unit in which the refrigeration unit is universally suspended from an overhead support in the cabinet of the refrigerator so that all components of the refrigeration unit may at all times be orientated in a constant relationship to a true vertical line and a true horizontal line thereby enabling all components of the refrigeration unit to be maintained at a constant orientation so that they will function properly. Such a suspension unit enables a refrigeration system of extremely lightweight construction to be used since it employs an electric heating assembly for motivating the refrigerant through the refrigeration unit rather than a compressor and motor assembly thereby greatly reducing the weight of the refrigeration unit and at the same time providing an extremely simplified and compact unit.

The present invention may be provided with a suitable electrical socket which may be attached to either a normal household electrical energy circuit of 110 volts or connected with a vehicle battery of either 6 or 12 volts by providing a suitable adapter for that purpose.

The refrigeration unit in and of itself incorporates a conventional refrigeration system which has been reduced in size for the purposes of incorporation into a portable insulated container for cooling the interior thereof.

Another object of the present invention is to provide a portable refrigerator or cooler having a universally suspended refrigeration unit therein which is simple in construction, easy to use, efficient for its particular purposes and relatively inexpensive to manufacture.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of the portable cooler or refrigerator of the present invention illustrating the orientation of the refrigeration unit therein;

FIGURE 2 is a longitudinal, sectional view taken substantially upon a plane passing along section line 2-2 of FIGURE 1 illustrating further details of the orientation of the refrigeration unit;

FIGURE 3 is a transverse, sectional view taken substantially upon a plane passing along section line 3-3 of FIGURE 1 illustrating further details of construction of the orientation of the refrigeration unit;

FIGURE 4 is a detailed sectional view taken substantially upon a plane passing along section line 4-4 of FIGURE 2 illustrating further details of construction of the suspension assembly for the unit;

FIGURE 5 is a detailed sectional view taken substantially upon a plane passing along section line 5-5 of FIGURE 2 illustrating further details of the suspension unit.

Referring now specifically to the drawings, the numeral

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10 generally designates the portable cooler or refrigerator of the present invention incorporating a suspension assembly generally designated by the numeral 12 for a refrigeration unit generally designated by the numeral 12.

The portable refrigerator includes a cabinet 16 of any suitable shape and size but for the purposes of illustrating an exemplary form of the invention, the cabinet is illustrated as being generally elongated and rectangular in configuration and including an outer wall 18 and an inner wall 20 spaced apart and provided with insulation 22 therebetween. A closure lid 24 is provided for the cabinet and the closure lid is hingedly supported from the cabinet 16 by a suitable hinge assembly generally designated by numeral 26 which is also of conventional construction thus enabling the lid to be moved from a closed position to an open position with one edge of the lid disposed below the top edge of the cabinet as illustrated in FIGURE 1. The ends of the cabinet 16 have loop-type handles 28 pivotally attached thereto for ease of carrying the refrigerator or cooler and also, latch mechanisms 30 are incorporated to interconnect the end walls of the cabinet 16 and the end walls of the lid 24. This portion of the structure of the cabinet is conventional and may vary depending upon the particular desires of the manufacturer. In other words, any suitable type of cabinet and lid may be employed and any suitable type of hinge mechanism may be employed for hingedly connecting the lid to the cabinet, any suitable type of handle may be employed and any suitable latch mechanism may be employed for retaining the lid in closed position.

Interiorly of the cabinet, there is provided a transverse partition 32 extending from the front to the back wall and secured to the bottom, the front and back walls of the cabinet by any suitable fastening means such as screw threaded fasteners or rivets 34. Adjacent the back wall, the partition 32 is provided with a vertically extending notch 36. A longitudinal partition 38 preferably of reticulated material or screen is disposed between the front edge of the notch 36 and the remote end edge thus dividing the interior of the cabinet into a plurality of compartments including a compartment 40 for receiving the material to be cooled such as canned drinks of various types, sandwiches, various food articles whereby the partition screen 38 will retain the articles being cooled out of the compartment 42 which receives the evaporator 43 of the refrigeration unit 14 which is suspended in a compartment 44 on the opposite side of the partition wall 32 from the compartments 40 and 42.

Extending from the front to the rear wall above the compartment 44 is a supporting strap 46 secured thereto in any suitable manner. Centrally of the supporting strap, there is provided a longitudinal slot 48 adjustably receiving a retaining bolt 50 on a vertical supporting bracket 52. The supporting bracket 52 has a socket 54 in the lower end thereof receiving the upwardly extending end portion 56 of a split ball socket 58. A retaining bolt 60 extends through the lower end of the supporting member 50 and retains the ball socket 58 in position. Universally adjustably disposed in the ball socket 58 is a ball member 62 having a depending externally threaded shank 64 thereon. The shank 64 extends through a horizontal leg 66 of a vertical bracket member 68. The horizontal leg 66 is provided with a longitudinal slot 70 therein and adjustment nuts 72 are threaded on the shank 64 and engage both the top and bottom surface of the leg 66 of the bracket 68 by virtue of which the bracket 68 may be vertically adjusted in relation to the cross strap 46 and also longitudinally adjusted in a direction perpendicular to the longitudinal axis of the slot 48 thus enabling universal adjustable orientation of the bracket 68.

The lower end of the bracket 68 is provided with a

reverse bend or hook portion 74 extending around a tube 76 forming part of the refrigeration unit and the terminal end of the reverse bend portion 74 is secured to the bracket by suitable fastening bolt 78 thus attaching the bracket 68 to the refrigeration unit 14 so that the refrigeration unit 14 is rigidly but adjustably attached to the shank 64. The details of the refrigeration unit 14 do not form any particular part of the present invention except for their association with the remainder of the components thereof including the orientation of a condenser 80 of the fin type which is disposed horizontally generally between two openings 82 having a screen closure 84 therein whereby air may circulate through the compartment 44 for purposes of extracting heat from the hot refrigerant by virtue of the air passing over the finned condenser unit 80.

The refrigeration unit also includes a heater assembly 84' at one end thereof which is electrically connected to a socket 86 by a flexible electrical conductor 88. The socket 86 is flush with the end wall of the cabinet and may receive a plug on the end of an extension wire for connection to either a household current or a vehicle battery by employing a suitable adapter. The socket may be of the male or female type with the flexibility of the conductor 88 being sufficient to enable free swinging or pivotal movement of the refrigeration unit from the ball and socket 58 and 62. The heater unit 84' discharges the hot refrigerant gas through a tube 90 into one end of the condenser 80 and the evaporator 43 receives the condensed refrigerant from a receiver for expansion through a suitable expansion device (not shown) for purposes of absorbing heat from the compartment 40. Due to the fact that the evaporator is orientated on one side of the supporting element, the entire refrigeration unit will be balanced when suspended from the ball and socket in a level condition as illustrated in the drawings when the cabinet is orientated in a level condition. However, in most cases, when a portable refrigerator of this nature is placed in the trunk of a vehicle or placed in any other area desired, it quite frequently is not in a level condition although it generally may be considered to be in an upright condition. Even a few degrees of inclination will cause the refrigeration unit of this type to become ineffective or inoperative. Thus, with the suspension arrangement of the present invention, the refrigeration unit will continue to be disposed in substantially a constant relationship to a vertical plane and a horizontal plane even though the cabinet may be disposed in inclined relation. Of course, the relative pivotal movement between the cabinet and the refrigeration unit is limited by the confines of the cabinet and normally the pivotal movement will enable the refrigeration unit to be disposed in a substantially constant relationship to a vertical and a horizontal plane during normal angular inclination of the portable refrigerator such as would occur when placing it in the trunk of an automobile or the like.

A slack flexible seal 37 of suitable plastic or other material is provided for the evaporator where it passes through the notch 36 thus enabling movement of the evaporator but at the same time preventing passage of air between the compartments 42 and 44. By the use of lightweight components such as plastics, aluminum and the like, the weight of the portable unit may be maintained at a minimum while at the same time providing sufficient strength and rigidity for long life and eliminating corrosive action by the foodstuffs, canned drinks or other articles placed in the refrigerator for cooling.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A portable refrigerator comprising a cabinet having a hollow interior and a lid movable between an open and closed position, a partition dividing the cabinet into a compartment for articles to be cooled and a compartment alongside thereof, a refrigeration unit disposed in the last mentioned compartment, and means suspending the refrigeration unit in the compartment for universal free gravitational movement in relation thereto thereby enabling the refrigeration unit to be disposed in a constant relationship to a true vertical and horizontal plane during inclination of the cabinet, said suspension means includes a supporting strap extending from the front to the rear of the cabinet, a socket member longitudinally adjustably mounted on the strap, a ball member having a depending shank universally supported in the socket, a bracket attached to the refrigeration unit and adjustably connected to the shank for vertical adjustment and longitudinal adjustment in perpendicular relation to the longitudinal adjustment of the socket on the supporting strap.

2. The structure as defined in claim 1 wherein said refrigeration unit includes an electric heater, an electrical socket mounted in the cabinet wall, and a flexible conductor connecting the socket and the heater for enabling movement of the refrigeration unit.

3. The structure as defined in claim 1 wherein said cabinet is provided with air circulation openings communicating with the compartment receiving the refrigeration unit for providing air cooling for the condenser portion of the refrigeration unit.

4. In a portable cooler having a refrigeration unit, a suspension assembly for suspending the refrigeration unit for free universal gravitational movement comprising a supporting member, a ball and socket assembly connected to the supporting member, and a bracket connected to the ball and socket assembly for attachment to the center of gravity of the refrigeration unit thereby supporting the refrigeration unit for movement in the nature of a pendulum during inclination of the portable refrigerator thereby maintaining the refrigeration unit in a predetermined relation to a vertical and horizontal plane.

5. The structure of claim 4 wherein the connection between the supporting member and the ball and socket assembly includes means for longitudinally adjusting the said assembly relative to the supporting member.

6. The structure of claim 4 wherein the connection between the bracket and the ball and socket assembly includes means for adjusting the bracket in perpendicular relation to the supporting member.

7. The structure of claim 6 wherein the adjusting means includes a pin integral with the ball and socket assembly slidably disposed within a slot on the bracket.

8. The structure of claim 5 wherein the adjusting means includes a pin integral with the ball and socket assembly slidably disposed within a slot on the supporting member.

9. The structure of claim 4 wherein the connection between the supporting member and the ball and socket assembly includes means for longitudinally adjusting said assembly relative to the supporting member, and the connection between the brackets and the ball and socket assembly includes means for adjusting the bracket in perpendicular relation to the supporting member.

#### References Cited in the file of this patent

#### UNITED STATES PATENTS

|           |              |                |
|-----------|--------------|----------------|
| 1,661,993 | Borda        | Mar. 6, 1928   |
| 1,983,056 | Teichmann    | Dec. 4, 1934   |
| 2,082,381 | Chamberlain  | June 1, 1937   |
| 2,522,623 | Likes et al. | Sept. 19, 1950 |
| 2,612,762 | Minghetti    | Oct. 7, 1952   |
| 2,945,414 | Blackstone   | July 10, 1960  |
| 2,987,901 | Coffey       | June 13, 1961  |