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W. D. POOLE

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SHIPPING PACKAGE

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Fig. 4.

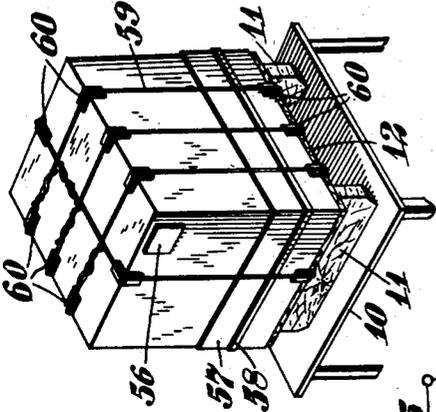


Fig. 2.

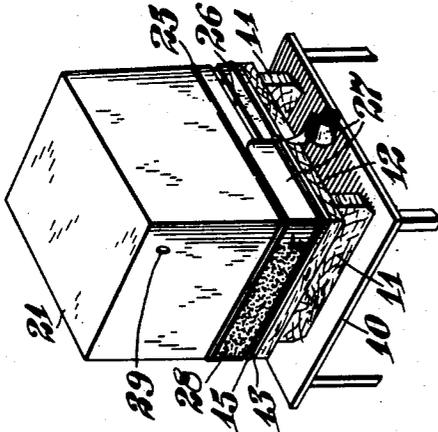


Fig. 1.

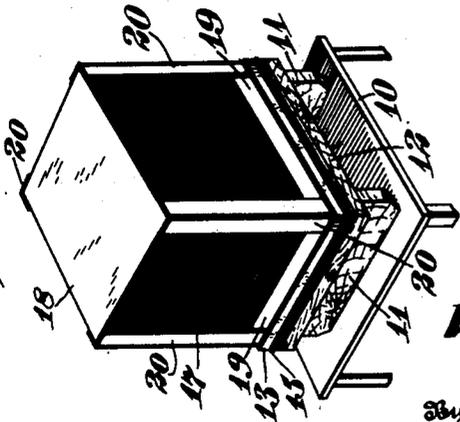
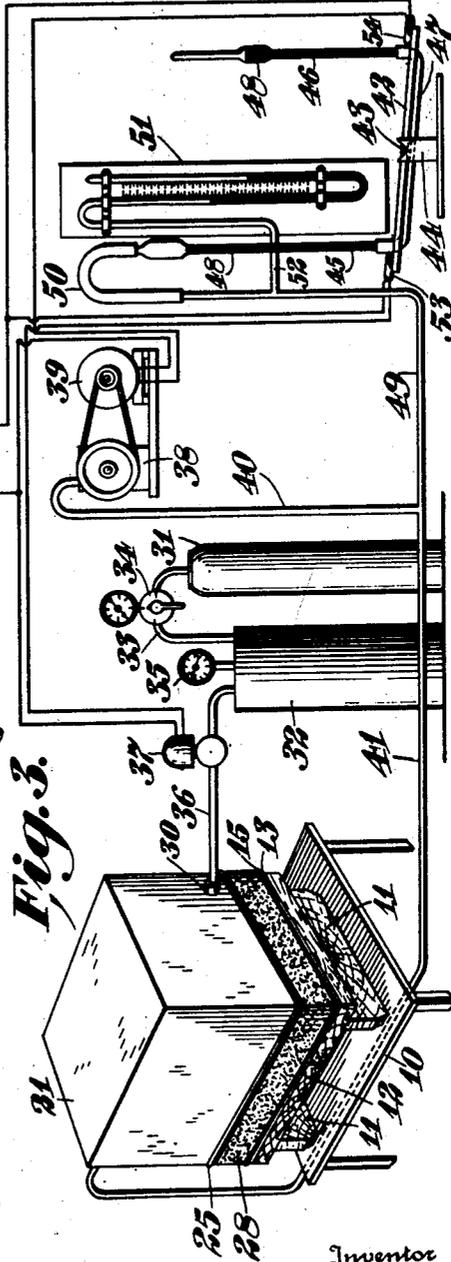


Fig. 3.



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SHIPPING PACKAGE

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My invention relates to a package for goods which are subject to deterioration under the influence of moisture, and particularly to a package for iron or steel sheets, commonly known as black plate. Such sheets are subject to rusting or other attack by moisture and as a result it is necessary to protect them from moisture, particularly during shipment from manufacturer to customer. Various methods are used to protect such sheets during shipment, such as oiling the individual sheets, wrapping the bundles in moisture-proof paper and the like, but such methods are not entirely satisfactory.

It is an object of my invention to provide a package for steel sheets or the like which is hermetically sealed against air and moisture.

Another object of my invention is to provide a package in which steel sheets or the like can be transported without danger of rusting.

A further object of my invention is to provide a hermetically sealed package, the interior of which is filled with an inert atmosphere such as carbon dioxide gas or the like.

A further object is to provide a package for steel sheets or the like which is strong enough to withstand the stresses of handling and shipping.

Other objects of my invention will appear from the following description and from the drawings, in which

Figure 1 is a view of a stack of sheets in the process of being packaged;

Fig. 2 is a view of the stack with the upper cover in place;

Fig. 3 shows the apparatus for introducing the inert atmosphere into the package; and

Fig. 4 is a view of the finished package.

Referring to the drawings, 10 is a table on which the packaging may be carried out. For convenience in handling, a wooden skid, including cross-pieces 11 and platform 12 is usually provided in the packaging of steel sheets, although such a skid is not an essential element of my invention.

Upon the skid is placed the lower pan 13, which is preferably made of sheet metal, the sides of which are provided with a bead 15 spaced a short distance from the upper edges thereof.

As shown in Figure 1, the sheets to be packaged are placed in a stack 17 upon the pan 13. As protection to the top sheet, a sheet 18 of fiber board or the like may be placed on top of the stack, and a similar sheet may be placed beneath the bottom sheet of the stack.

Around the base of the stack 17 and within the sides of the pan are inserted the strips 19 which

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extend several inches above the top of the pan and serve to protect the edges of the stacked sheets from the sealing material, as hereinafter described. The strips 19 may conveniently be cut from rejected sheets of the material being packaged.

Strips 20 of corrugated cardboard or the like may be provided at the corners of the stack to prevent damage in transit.

Referring to Figure 2, the pan 21 is next placed over the stack. The sides of pan 21 are provided with a bead 25, similar to the bead 15 on pan 13.

Each of the pans 13 and 21 is preferably made of a single sheet of metal with the corners cut out and the sides bent over, the edges being welded to provide an air-tight and water-tight joint. The pans may however be made of any other material which is sufficiently strong and is impervious to air and moisture.

The combined height of the sides of the pans 13 and 21 is such that when they are placed over the stack 17 their outer edges are separated by a small space as shown at 26, in Figure 2.

As the next step in packaging the stack of sheets, a flexible adhesive tape 27 is applied to the pans 13 and 21 to seal the space 26 between the pans. The tape 27 should be impervious to air and moisture. As a further precaution against leakage of air and moisture into the package, I apply to the tape 27 a coating 28 of moisture- and air-impervious material. I have found that a mixture of methacrylate varnish and rubber enamel in equal proportions is suitable for this purpose.

It will be seen that the strips 19 (Figure 1) serve to protect the edges of the sheets contained in stack 17 from any damage which might result from contact with the surface of tape 27.

Referring to Figure 2, the pan 21 is provided near the top with a hole 29, while, as shown in Figure 3, a hole 30 is provided in the opposite end of the pan near the lower edge thereof. These holes serve as vents through which air is removed from the package and is replaced with an inert atmosphere such as carbon dioxide, which I have found suitable for the purpose, although any other inert gas, such, for example, as nitrogen, may be substituted for carbon dioxide.

Referring to Figure 3, 31 is a high pressure cylinder of carbon dioxide gas in the form supplied by commercial producers of that and similar gases, the cylinder 31 being connected with tank 32 by pipe 33 and needle valve 34. A pressure gauge 35 is attached to tank 32. Tank 32 is con-

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ected by pipe 36 and electromagnetic valve 37 to the opening 30 near the bottom edge of pan 21.

38 is a vacuum pump of standard design which is operated by electric motor 39 and is connected by pipes 40 and 41 to the hole 29 near the top of pan 21.

The exhaustion of air from the package and the introduction of carbon dioxide therewith is controlled by the balance 42 which is pivoted at 43 on the support 44. To the balance 42 are affixed the vertical tubes 45 and 46 which are connected at their lower ends by the tube 47 and are partially filled with mercury 48. The tube 45 is connected at its upper end to the vacuum line 40 by pipe 49 and flexible tubing 50. 51 is a manometer of standard form which is connected to the pipe 49 by pipe 52. 53 and 54 are mercury switches through which the electromagnetic valve 37 and the motor 39 are respectively connected to the current source 55.

The operation of the above described mechanism is as follows.

A suitable amount of gas is introduced from cylinder 31 into tank 32 by opening needle valve 34, which is then closed. The amount of gas so introduced into tank 32 is not critical but I prefer to introduce into the tank an amount of gas equal to five or six times the cubic content of the package to be treated. Gauge 35 may be used to determine the amount of gas introduced into tank 32.

With the balance 42 in the position shown in Figure 3, mercury switch 53 is open, while mercury switch 54 is closed, establishing the circuit which operates motor 39. Vacuum pump 38 is operated by motor 39 and exhausts air from the package and at the same time from the tube 45 thereby causing mercury to flow from tube 46 through tube 47 into tube 45. During this part of the cycle valve 37 is closed.

When a sufficient amount of mercury has been drawn into tube 45 the balance 42 is automatically tripped, thereby opening switch 54 and closing switch 53. Motor 39 accordingly stops and valve 37 is opened, allowing gas to flow from tank 32 into the package. This relieves the vacuum in the package and in the lines 40, 41, 49 and 50 and permits the mercury to flow back into tube 46. When a sufficient quantity of mercury has flowed into tube 46 the balance 42 is again restored to the position shown in Figure 3 and the cycle is repeated.

The manometer 51 indicates the pressures at which the apparatus operates. I find a vacuum equal to 8 inches of mercury suitable for the vacuum phase of the cycle while pressure phase of the cycle should be continued until substantially atmospheric pressure has been reached in the package. These conditions may be obtained and/or varied by suitably weighting balance 42.

The cycle above described will be repeated as long as the gas pressure in tank 32 remains above atmospheric. I have found that six cycles will produce a carbon dioxide concentration in the package of about 90%, which is sufficient to protect steel sheets from rusting.

Upon the conclusion of the above operation, the pipes are removed from the package and the openings in the package are sealed as shown at 56 with tape or otherwise.

To protect tape 27 from damage during transit I cover it with strip 57 of sheet metal or the like (Figure 4) which rests on the beads 15 and 25, out of contact with the tape 27. Strip 57 may be held in place by steel strap 58. The pack-

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age is then suitably wired or strapped as shown at 59, using metal clips 60 to protect the edges of the package from damage by the tie wires.

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

1. An article of manufacture, comprising two oppositely disposed pans arranged with their outer edges adjacent to each other to define a space, steel sheets contained within the space defined by the pans, a sealing strip lapping said edges to form a substantially moisture-proof container, and an inert atmosphere within the container formed by said pans and sealing strip.

2. An article of manufacture, comprising two oppositely disposed pans for enclosing material to be packaged, material enclosed by said pans and separating the adjacent edges of said pans from each other, a flexible sealing strip lapping said adjacent edges and closing the space between them, a protective strip surrounding said flexible strip and tie wires surrounding and binding the above mentioned parts in substantially immovable relationship to one another.

3. An article of manufacture, comprising two oppositely disposed pans of substantially equal bottom area for enclosing material to be packaged, material enclosed by said pans and separating the adjacent edges thereof from each other, each pan having a protruding bead adjacent the outer edge of the sidewalls thereof, a flexible sealing strip lapping said adjacent edges and closing the space between them, said pans and sealing strip forming a substantially moisture-proof container for the material, a protective strip surrounding said flexible strip and spaced therefrom by said beads, tie wires surrounding and binding the said pans and protective strip, and an inert atmosphere within the container.

4. A shipping package for steel sheets, comprising two oppositely disposed pans of moisture-proof material enclosing a stack of such sheets, the combined height of the sidewalls of said pans being somewhat less than the height of said stack, moisture-proof sealing strip lapping the opposed edges of said pans and closing the space between them and an inert atmosphere within the package.

5. A shipping package for steel sheets, comprising two oppositely disposed pans of moisture-proof material enclosing a stack of such sheets, the combined height of the sidewalls of said pans being slightly less than the height of said stack, a flexible, moisture-proof sealing strip lapping the opposed edges of said pans and closing the space between them, a protective strip surrounding said flexible strip, tie wires surrounding and binding said pans and protective strip in substantially immovable relationship to each other, and an inert atmosphere within the package.

6. A shipping container for steel sheets, comprising two oppositely disposed pans of moisture-proof material having substantially vertical sidewalls and enclosing a stack of such sheets, the combined height of said pans being not in excess of the height of said stack, the sidewalls of each of said pans being provided with a continuous protruding bead a short distance from the outer edge thereof, a flexible, moisture-proof sealing strip lapping the opposed edges of said pans to form a substantially moisture-proof container, a protective strip surrounding said flexible strip and lying against said beads, and an inert, moisture-free atmosphere within the package.

7. A shipping container for steel sheets, com-

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prising two oppositely disposed pans of moisture-proof material having substantially vertical sidewalls and enclosing a stack of such sheets, the combined height of said pans being not in excess of the height of said stack, the sidewalls of each of said pans being provided with a continuous protruding bead a short distance from the outer edge thereof, a flexible, moisture-proof sealing strip lapping the opposed edges of said pans to form a substantially moisture-proof container, a protective strip surrounding said flexible strip and lying against said beads, tie wires surrounding the package and binding the parts thereof in substantially immovable relationship.

8. An article of manufacture, comprising two oppositely disposed pans of substantially equal bottom area for enclosing material to be packaged, material enclosed by said pans and separating the adjacent edges thereof from each other, each pan having a protruding bead adjacent the outer edge of the sidewalls thereof, a flexible sealing strip lapping said adjacent edges and closing the space between them, said pans and sealing strip forming a substantially moisture-proof container for the material, a protective strip surrounding said flexible strip and spaced therefrom by said beads, tie wires surrounding and binding the said pans and protective strip.

9. A shipping package for steel sheets, comprising two oppositely disposed pans of moisture-proof material enclosing a stack of such sheets, the combined height of the sidewalls of said pans being slightly less than the height of said stack, a flexible, moisture-proof sealing strip lapping the opposed edges of said pans and closing the space between them, a protective strip surrounding said flexible strip, tie wires surrounding and binding said pans and protective strip in substantially immovable relationship to each other.

10. A shipping container for steel sheets, comprising two oppositely disposed pans of moisture-proof material having substantially vertical sidewalls and enclosing a stack of such sheets, the combined height of said pans being not in excess of the height of said stack, the sidewalls of each of said pans being provided with a continuous

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protruding bead a short distance from the outer edge thereof, a flexible, moisture-proof sealing strip lapping the opposed edges of said pans to form a substantially moisture-proof container, a protective strip surrounding said flexible strip and lying against said beads.

11. A package for steel sheets comprising two oppositely disposed pans for enclosing the steel sheets and having their outer edges adjacent to each other, steel sheets contained within said pans, a sealing strip lapping said edges to form a substantially moisture-proof package and a protective strip surrounding said sealing strip.

12. A package for goods comprising two oppositely disposed pans for enclosing the goods and having their outer edges adjacent to each other, each pan having a continuous protruding bead a short distance from its outer edge, a flexible sealing strip lapping said adjacent edges to form a substantially moisture-proof container, and a protective strip surrounding said sealing strip and spaced therefrom by said beads.

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