E. J. PEGLER.

TRANSPARENT INSULATION.

APPLICATION FILED FEB. 4, 1921.

1,428,056. Patented Sept. 5, 1922.

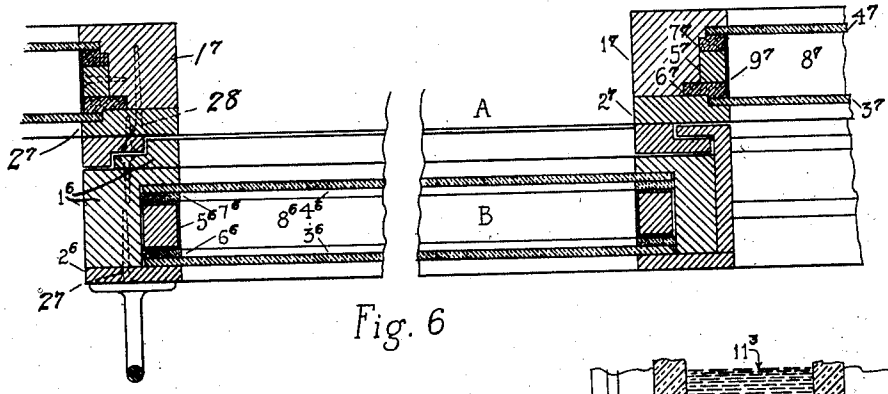

Fig. 6

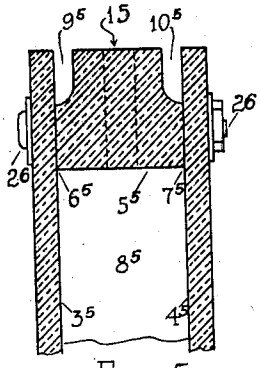

Fig. 5

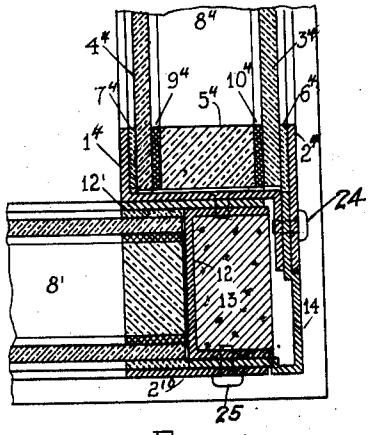

Fig. 4

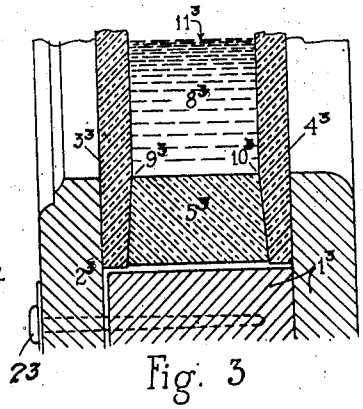

Fig. 3

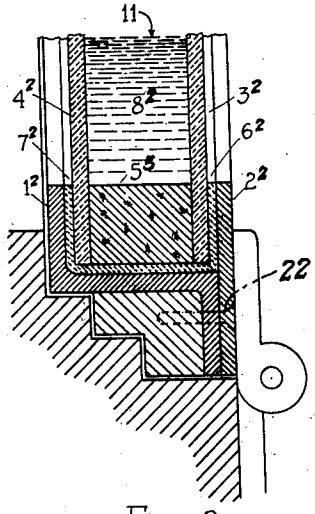

Fig. 2

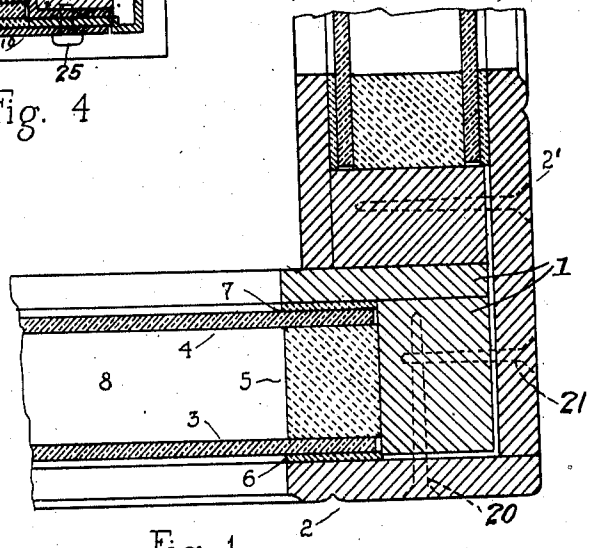

Fig. 1

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UNITED STATES PATENT OFFICE.

EMILE JOSEPH PEGLER, OF NEW YORK, N. Y.

TRANSPARENT INSULATION.

Application filed February 4, 1921. Serial No. 442,476.

To all whom it may concern:

Be it known that I, EMILE JOSEPH PEGLER, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Transparent Insulations, of which the following is a specification.

This invention relates to improvements in transparent insulations for windows, artificially cooled show cases and counters, display wall openings of cool rooms, and for transparent parts of refrigerators.

The present invention is an improvement of my patent for transparent refrigerators, No. 1,219,764, March 20, 1917.

The object of this invention is to increase the heat transfer resisting property of transparent liquid insulations and to provide air-tight glass containers which preserve permanently the colorless clear appearance of these liquids.

I employ oils of mineral or vegetable origin as petroleum, bleached olive oil, etc., alone, or a suitable compound of such oils. Or, I use, instead of oils, concentrated solutions of double or single salts as magnesium sulphate, zinc sulphate, or alums, as hereafter described, and sulphuric acid to increase the stability of aqueous solutions.

In preparing the liquid part of this transparent insulation I prefer to use the ingredients in about the following manner and proportions without confining myself strictly to these hereafter specified proportions.

If I take kerosene, the derivative of petroleum refined, decolorized and deodorized, preferably the best grades known as "water-white," I deodorize it still more than it has been deodorized in the refinery, by one of the well known processes such as filtering it through bone charcoal. At a specific gravity of about 0.78 it gives the best results. Or, I use glycerin, double distilled, chemically pure, usually of the specific gravity of about 1.20, containing 20% water. I dilute same with boiled water to about 1.159 specific gravity obtaining then about 60% pure glycerin, and use this diluted glycerin as a solvent of alum, taking two pounds of powdered alum per gallon of diluted glycerin, which I heat for an hour at a temperature of not over 100° F. in order to avoid giving a yellowish tint to the water-like colorless solvent, and agitate thoroughly by means of any of the known mechanical mixers for a longer period of time than is necessary for the visible particles of alum to be dissolved. I obtain in about a day a perfectly clear colorless solution.

The water I employ is well boiled and warmed again before being used as a solvent, in order to prevent the appearance of air bubbles on the wall of the glass containers later due to temperature changes. I dissolve therein magnesium sulphate taking preferably two to three pounds of it per gallon of said solvent, warmed to any suitable temperature below 150°, in order to avoid driving off the water of hydration (frequently called water of crystallization) of said salt; in order not to diminish, even destroy, the great heat transfer-resisting characteristics of metallic salt solutions. After the solution is left undisturbed for a few days, a slight quantity of impurities will settle at the bottom of the dissolving tank, remaining there while the perfectly clear solution is drained off.

Of zinc sulphate I prepare an aqueous solution in the same manner and proportions as hereinbefore described with magnesium sulphate. Both being miscible with each other as well as with alum and easily soluble, the process remains the same if they are mixed, forming a double salt. These salts can be used in combination with each other, or each separately.

Glycerin I prefer to use where its low freezing point renders it necessary as a solvent for alum and also for magnesium sulphate.

As to aqueous alum solutions it is long well known that a saturated solution of alum has the peculiar property of absorbing the long ether waves of heat rays, but this heat transfer-resisting power could not be exploited because of the fatal reappearance and spontaneous growth of alum crystals, which weaken the original strength of the solution to uselessness. To avoid this condition I use the following treatment:

I dissolve alum in warm water taking one pound of alum per gallon of water, and let the alum recrystallize by cooling and not disturbing it for a day, in an open vessel protected from dust and made of a material which does not color the solution; the new crop of crystals I dissolve in the mother-liquor heated to 210° F. (but not over) during agitation, which should last longer than the visible particles of alum

are seemingly dissolved, in order to dissolve thoroughly even the invisible particles; after that I keep this second solution in a closed dissolving tank to be transferred therefrom into purified glass containers in the absence of atmospheric air.

As known, the presence of atmospheric air is harmful to any alum solution in which reaction must be prevented, for even the invisible small particles of alum, which are present in the air everywhere, form readily a nucleus to recrystallization. Therefore, the recrystallization itself or the keeping in tight containers is all worthless if the container has not been purified, or if the solution has been in contact with air during its transfer from the dissolving tank to the glass container. The indispensable preventive measure to be strictly observed is to inject hot steam of 212° into the empty glass containers before filling, and to connect the dissolving tank, or the tank in which the ready liquid is stored, with a well steamed hose or tube to the said steamed glass container in order to transfer the liquid by gravity or pressure, and have the air (which is necessary to commence and maintain the flow of a liquid) supplied from an air supply tank connected to the upper part of the liquid holding tank; the air contents of this air-supply tank having been also steamed to dissolve any invisible alum particles present in the air within the air tank. It is obvious that the above named liquid dissolving or holding tank and air supply tank can be of any required shape or size and of a suitable approved material.

The stability of a salt solution will be increased by an addition of sulphuric acid composing one half of one per cent of the whole solution.

In the accompanying drawing forming a part of this specification,

Fig. 1 is a fragmentary sectional plan taken at a corner of a display counter;

Fig. 2 is a fragmentary section of an insulated hinged glass door of an ice-box;

Fig. 3 illustrates a fragmentary section of an insulated glass panel;

Fig. 4 shows a fragmentary plan taken at a corner of an insulated show case;

Fig. 5 is a fragmentary (vertical) section of a glass container; and

Fig. 6 represents a fragmentary plan of the front of a display wall casing and its sliding door.

Referring now particularly to Fig. 1, I have illustrated a fragmentary plan of a framing (taken at a corner of a display counter) comprising an inner two piece wooden member 1, and fastened thereon are outer wooden members 2 and 2^1 with counter-sunk screws as 20 and 21 (shown in dotted lines) holding glass panes 3 and 4, separated by member 5 which is a rectangular bar made of any suitable plastic composition, preferably one which is adhesive to glass, to form watertight joints therewith, as "lead-glyceride," or numerous others. Rubber strips 6 and 7 line the edges of glass panes 3 and 4 where they are in contact with wooden members 1 and 2. Numeral 8 designates a part of the watertight space, which I call a "container" for a liquid. The hereinbefore described framing shown in Fig. 1 can be assembled without difficulties, by placing in its two piece inner member 1 the rubber strip 7, then, glass pane 4, separator member 5, upon that glass pane 3 and rubber strip 6, finally, to be covered with outer member 2 or 2^1; then all these assembled parts are temporarily pressed together with cabinetmaker tools called "wood-jaws," and at the outer face of outer members 2 and 2^1 thin holes are drilled, whence the drill goes through into member 1 extending thereby the hole to receive screws as 20 and 21 which are to be somewhat thicker than the holes drilled for them, in order to hold better after they had been driven in. When the framing is thus completed the temporary wood-jaws will be removed, and so evidently there is a permanent pressure maintained between two members as 1 and 2 fastened together securely by screws 20 and 21. Glue and dowels, or nails could be used instead of said screws, although nails are less practical than screws.

Fig. 2 is a fragmentary section of a framing at a hinged door of an icebox. Of this framing galvanized iron Z-bar 1^2 is a one piece inner member, and fastened thereon, by countersunk screw 22, is the galvanized flatiron 2^2 as an outer member to hold in place glass panes 3^2 and 4^2 which are separated by member 5^2 which is a rectangular bar made of solid cork boiled in a preserving and waterproofing compound as paraffin, or the like, in order to become more elastic when it is pressed in place while warm, which pressure is exerted automatically through assembling and screwing together inner and outer members 1^2 and 2^2, said member 5^2 being a separator between them. Thus is formed a watertight filling space 8^2 for liquid contents as 11. The edges of said glass plates 3^2 and 4^2 are protected by rubber cloth packing 6^2 and 7^2 where they are in contact with inner and outer frame-members 1^2 and 2^2.

Fig. 3 is another fragmentary section of an insulating means consisting of a glass panel frame of which 1^3 is a wooden inner two piece member thereof, and fastened thereon is the wooden outer member 2^3 by round-head screw 23, to hold in place glass plates 3^3 and 4^3 which are separated by member 5^3 to form space 8^3 which contains a liquid 11^3. At joints 9^3 and 10^3 the mem-

ber 5^3, which is a glass bar, and the slightly bevelled glass plates 3^3 and 4^3 are frosted with hydrofluoric white acid to a dull smooth finish, to render these joints 9^3 and 10^3 watertight by the pressure exerted through the forceful connection and customary fastening together of frame-member 1^3 and 2^3. An approved glass cement is applied to tighten said joints 9^3 and 10^3 if glass bar separator member 5^3 is not perfectly straight.

Fig. 4 represents a fragmentary plan at a corner of a show case showing a framing of which one piece inner member 1^4 is a drawn metal Z-bar, and fastened thereto by round head screw 24 is the nickel-plated outer member 2^4 (which is a common glass stop) holding in place glass panes 3^4 and 4^4 which are separated by rectangular glass bar frame-member 5^4 which has along its both sides asbestos ribbons 9^4 and 10^4 as elastic water-proofing between glass bar member 5^4 and the edges of glass panes 3^4 and 4^4 said panes being protected on the outside by rubber strips 6^4 and 7^4 against pressure exerted by screwing together tightly inner and outer members 1^4 and 2^4, thereby forming watertight space which I call a container 8^4. Container 8^1 is surrounded by metal channel member 12 with a flat metal glass stop as inner member 12^1 fastened thereon, and a nickelplated flat metal glass stop as outer member 2^{10} screwed on said channel member 12 in which cork filler 13 serves as an insulation. Outer frame members 2^4 and 2^{10} of containers 8^1 and 8^4 are connected by angle 14.

Fig. 5 is a fragmentary vertical section of a transparent insulation showing the upper part of a glass container in which nickel-plated bolt 26 goes through and holds together glass plates 3^5 and 4^5 and also goes through glass bar separator 5^5 which serves also as an internal frame member for the thus formed container 8^5. Joints 6^5 and 7^5 between the inner parts of bar 5^5 and glass plates 3^5 and 4^5 are tight, even if not treated with an approved adhesive before assembled; while 9^5 and 10^5 are rabbeted edges of the outer part of bar 5^5 which are to be filled with an approved glass cement for waterproofing, all the said joints being treated previously with white acid, or sandblasting, to have dull opaque surfaces to receive and hold said adhesive glass cement. On said glass bar 5^5 there is indicated with dotted lines vertical passage 15, normally to be kept closed by a glass cement filler. This container shown in Fig. 5 is an independent unit which can be not only inserted as a panel in any suitable wall or frame, but if desired the "all glass" casings made of such units, can be built without framing in the same manner as they have been built hitherto of single uninsulated glass plates without framing, and held together by nickel-plated clamps. Where said bar 5^5 is obtainable made of a glass having the same coefficient of expansion as glass plates 3^5 and 4^5 their connecting parts can be fused instead of being cemented as hereinbefore described; and in this case, the fastening bolts as 26 eliminated altogether. On the other hand, said bolt 26 can be used also when glass bar 5^5 is replaced by a bar as 5, described and shown in connection with Fig. 1; or, replaced by a bar as 5^6, with rubber strips 6^6 and 7^6 thereon, as in Fig. 6.

Fig. 6 is a fragmentary plan reduced to half of that scale in which all the other figures are drawn, showing the framing at the front part of a florist's wall casing A having a projecting sliding door B of which the middle part is broken away. On this sliding door B said framing consists of a wooden one piece inner member 1^6, and fastened thereto, by screws as 27, is outer member 2^6 to hold in place glass plates 3^6 and 4^6 which are separated by metal covered wooden separator member 5^6, waterproofed by elastic rubber ribbons 6^6 and 7^6, thus forming container 8^6. Said metal cover of wooden separator 5^6 must be not only of a non-corrosive thin foil but must suit also the particular property of different liquid contents for which purpose lead, zinc or aluminum may be employed.

The frame of wall casing front A in Fig. 6 has an inner one piece member 1^7 and fastened thereto, with screws as 28, is outer member 2^7 to hold glass plates 3^7 and 4^7. The joints are waterproofed by glycerin putty fillers 6^7 and 7^7 (or, fillers of another approved putty) separated by wooden strip member 5^7. A thin metal ribbon 9^7 is used as a top cover for said putty fillers 6^7 and 7^7 and for wooden separator 5^7. Thus is formed container 8^7, which may contain a liquid without having the liquid contents in contact with any of the said wooden frame members. This construction is simple and economical to manufacture.

The connections between frame members of all the hereinbefore described forms of containers belong to the well known art, to fasten together assembled parts of a framing with screws; in this art it is known that conical shaped so called "wood screws" (of metal) are used in wooden frames, and straight screws in metal frames, and that bolts are practical for "all glass" connections. The said screws might be "countersunk" or "round head" screws, preferably of a non-corrodable material.

Means for a transparent insulation comprising a liquid requires glass containers, which must be either blown or cast of one piece, or else built up of members fastened tightly together by the simplest approved means which involves that glass panes held

in a frame and jointed water tightly are indispensable parts of this invention; however, I do not claim a specific form, as equivalent but not identical forms serve the same purpose.

Having described my invention, I claim:—

1. Heat insulating means comprising a transparent glass container and a permanently transparent liquid therein having greater heat-transfer-resisting properties than water.

2. Heat insulating means comprising a transparent glass container and a permanently transparent liquid therein containing a suitable salt and a solvent therefor.

3. Heat insulating means comprising a transparent glass container and a permanently transparent liquid therein comprising a salt dissolved in glycerin.

4. Heat insulating means comprising an air-tight container for liquids composed of transparent glass plates separated in parallel relation by an internal frame separator, said plates and separator being cemented, pressed and fastened together to form water-tight joints and a permanently transparent liquid in said container having greater heat-transfer-resisting properties than water.

5. Heat insulating means comprising a container for liquids, comprising plates of transparent glass suitably spaced from each other by a separator, a frame surrounding said glass plates composed of a plurality of members, means for applying and sustaining pressure between such members and means for producing waterproof joints between said frame and glass plates and a permanently transparent colorless liquid in said container having greater heat-transfer-resisting properties than water.

6. Heat insulating means comprising a container for liquids, comprising plates of transparent glass suitably spaced from each other, a frame surrounding said plates, means for producing waterproof joints between said frame and glass plates and a permanently transparent colorless liquid in said container composed of a clear stable solution of a suitable salt in a solvent.

7. Heat insulating means comprising a transparent glass container and a permanently transparent alum solution therein.

In witness whereof, I have signed my name to the foregoing specification in the presence of two subscribing witnesses.

EMILE JOSEPH PEGLER.

Witnesses:
HELEN V. WHIDDEN,
FREDERICK P. RANDOLPH.