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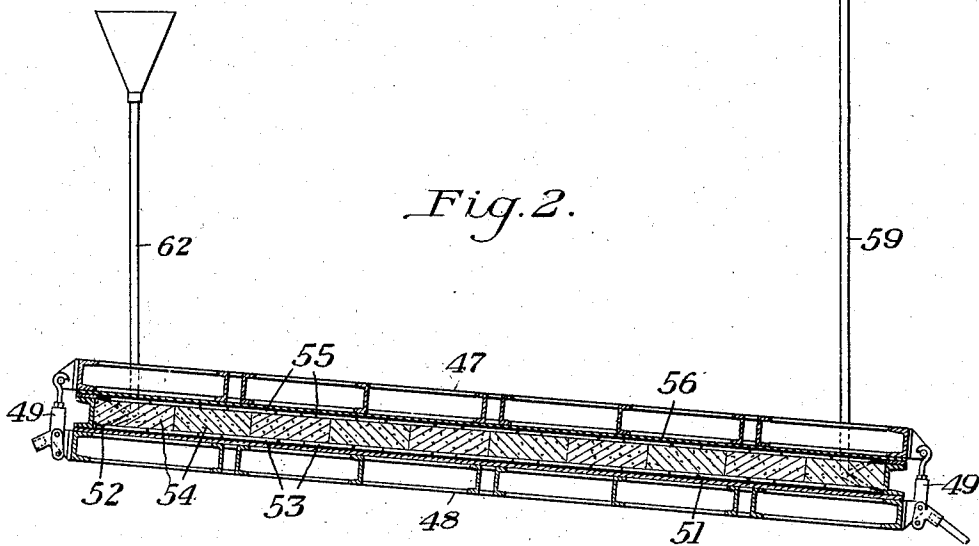
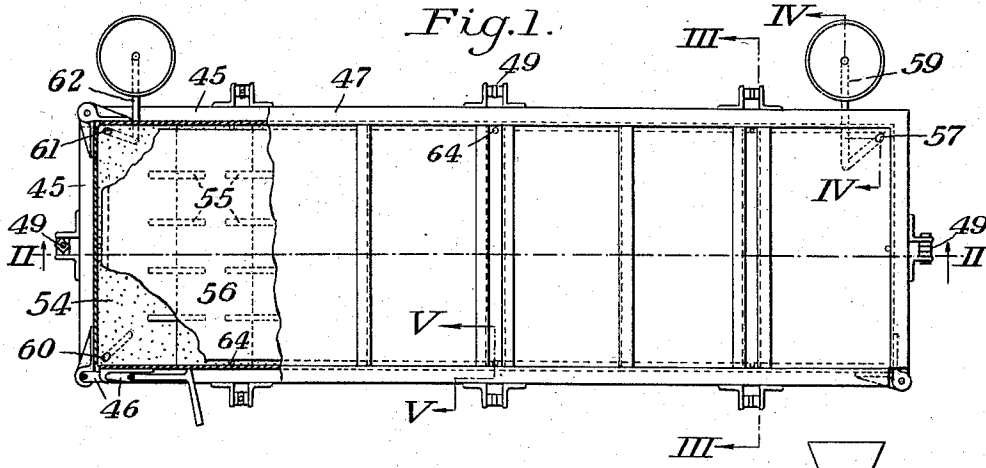
L. L. KNOX

1,746,596

METHOD OF MAKING COMPOUND WALL STRUCTURES

Filed May 14, 1926

2 Sheets-Sheet 1



INVENTOR

Luther L. Knox,
By *Bernie Edwin Parmelee*,
his atty.

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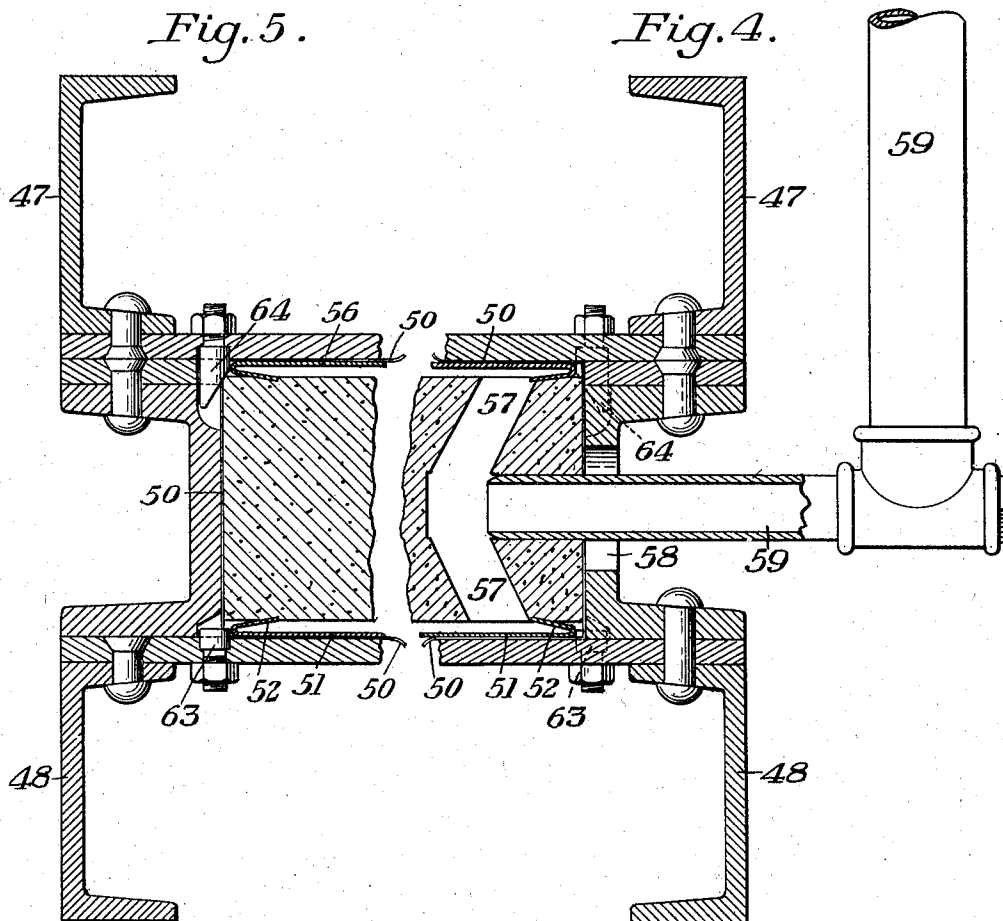
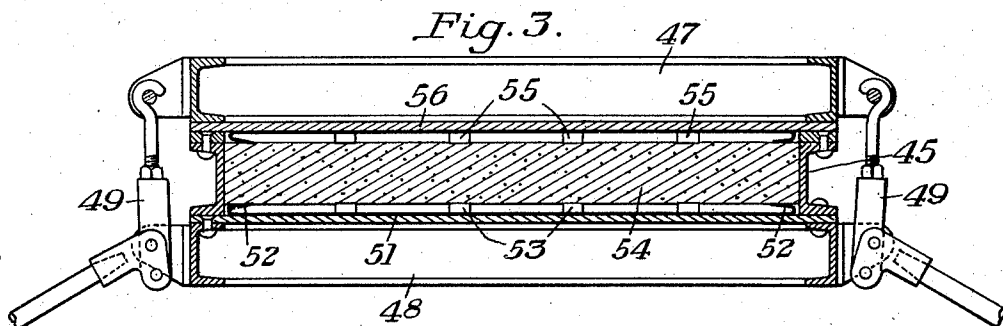
L. L. KNOX

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METHOD OF MAKING COMPOUND WALL STRUCTURES

Filed May 14, 1926

2 Sheets-Sheet 2



INVENTOR

Luther L. Knox,
By James Stebbins Parmelee
his atty.

UNITED STATES PATENT OFFICE

LUTHER LOUCINE KNOX, OF BELLEVUE, PENNSYLVANIA, ASSIGNOR TO KNOX PRODUCTS COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

METHOD OF MAKING COMPOUND WALL STRUCTURES

Application filed May 14, 1926. Serial No. 109,182.

The present invention relates broadly to compound or composite wall structures and methods of making the same, and more particularly to wall structures of the general character referred to, particularly useful in apparatus such as refrigerators, ice boxes, ice cream cabinets, or the like, in which effective heat insulation properties are desirable. Throughout the specification and claims, the terms refrigerator or refrigeration will be utilized in their generic sense as definitive of structures of this general class.

In compound wall structures, and particularly structures of this character as utilized in the art of refrigeration, it is desirable that the structure shall possess not only the attribute of permanency but also that of effectively minimizing the transfer of heat between the adjacent surfaces thereof.

Heretofore, in the art of refrigeration, it has been proposed to utilize preformed slabs or blocks of insulating material, such as cork, and protect the same by outside coverings of steel or other suitable material. While such preformed slabs are highly desirable from the standpoint of permanency, as to their position within a wall, their use has been objectionable for the reason that a frame is required for properly holding such insulation in place, and for the further reason that in actual use the air circulation adjacent thereto precipitates moisture in the interior of the cork which subsequently becomes frozen and thereby destroys the effectiveness of the cork for insulation purposes.

In accordance with the present invention, there is provided a wall structure which possesses permanency not only with respect to its structural characteristics but with respect to its insulating properties, and furthermore, a structure in which the use of supplemental framework is made unnecessary.

In the accompanying drawings, there are shown for purposes of illustration only, certain preferred embodiments of the present in-

vention, it being understood that the drawings do not define the limits of my invention as changes in the construction and operation disclosed therein may be made without departing either from the spirit of the invention or the scope of my broader claims.

In the drawings, Figure 1 is a top plan view, partly broken away, illustrating one manner of constructing a wall section in accordance with the present invention. Figure 2 is a longitudinal section view on the line II—II looking in the direction of the arrows. Figure 3 is a transverse sectional view on an enlarged scale on the line III—III of Figure 1 looking in the direction of the arrows. Figure 4 is the detail sectional view on an enlarged scale on the line IV—IV of Figure 1. Figure 5 is a detail sectional view on an enlarged scale along the line V—V of Figure 1.

The present invention contemplates a wall structure of such characteristics that it is adapted to be formed in sections, if desired, thereby permitting the sections to be assembled in any desired manner or relationship for producing completed structures of different dimensions or characteristics. The invention will, therefore, be defined, in connection with the accompanying drawings, as applicable to the formation of sections which sections are subsequently adapted for assembly as required to provide the finished structure having the desired dimensions.

The size of the sections having been previously determined upon, there is constructed a frame 45 as shown for example in Figures 1 to 5 both inclusive, of the drawings. This frame may conveniently comprise side and end channels preferably so connected as by clamping levers 46 as to permit a body placed within the frame to be compressed both transversely and longitudinally by the operation of drawing the side and end channels together. Adapted to cooperate with the frame, is a top platen 47 and a bottom platen 48, the platens being so constructed as to per-

mit the use therewith of clamping and holding means 49 by which the platens may be urged toward each other for compressing a body located there between or for preventing bulging or spreading of the component parts thereof.

In accordance with the present invention, the frame is placed on the lower platen and the entire frame is then lined with suitable material 50 such as paper or the like. Thereafter a finishing sheet 51 of protective material of metal or the like, is placed within the frame in position on the lower platen, the sheet having inturned edges 52 as clearly apparent from the drawings. Thereafter any desired number of chaplets or other spacing means 53 may be placed on the sheet 51, each of these spacing means having a thickness substantially equal to the depth of the space provided by the inturned edges 52. A section or sections comprising blocks, slabs or the like of preformed insulating material 54, such as cork, substantially filling the space between the sides and ends of the frame is then placed in position, additional chaplets or spacing means 55 placed thereon, and a top sheet 56 similar to the sheet 51 is placed thereover. The lining 50 is then bent downwardly over the upper sheet 56, as clearly apparent in Figures 4 and 5, the top platen is placed in position, and the cams or other clamping means 49 operated to securely clamp the structure in assembled position.

Prior to the insertion of the insulating material, one of the slabs or sections thereof, or one of the corners of the insulating material, if a single slab is utilized, is provided with angularly extending openings 57 intersecting as clearly shown in Figure 4 of the drawings. Adjacent one corner of the frame there is also provided an opening 58 into which may extend a pipe 59 in such position as to communicate with the openings 57. At other corners of the structure, as indicated for example in Figure 1, there are provided similar openings 60 and 61, the opening 60 providing communication between the spaces above and below the insulating material for the passage of air while the opening 61 provides similar communicating channels for the filling and binding material. Connected in any desired manner with the channel 61, as for example in the manner indicated in Figure 1, is an overflow connection 62, passing through a suitable opening in the side of the frame 45. After the connections 59 and 62 are secured in position, the openings in the frame through which they pass may be luted with clay or similar material to properly seal the same. Thereafter, the entire structure is preferably placed in an inclined position as indicated for example in Figure 2, and the desired filling material in molten or liquid condition, is poured through the connection 59 into the

lower end of the assembly. This filling material gradually fills all of the void and expels the air, the operation continuing until the filling material is visible in the overflow connection 62. Paper or other lining 50 prevents undesirable spreading of the filling material between the joints and insures a finished section in which all of the void space between the insulating material and the protective covering is filled by the poured in filling.

In accordance with the preferred embodiment of my invention the filling material will be effective for completely sealing the insulating material whereby the access of moisture to such material is prevented. In this manner, the possibility of moisture condensation and subsequent freezing in the cork or other insulating material is effectively prevented and the insulating properties of the wall structure become permanent both with respect to their structures and their insulating attributes.

In any case, however, whether a complete sealing of the cork is effected or not, the filling material serves as an effective means for preventing air circulation, and in the absence of such air circulation, moisture condensation is effectively prevented.

The structure resulting from the method disclosed herein, has, as will be apparent from the foregoing description, not only permanency as to insulation and as to the position of the insulation which is such that shift thereof cannot take place, but it obviates necessity of any supplemental framework for holding the insulation in position.

The filling material utilized is preferably of such nature that it is adapted to liquefy under heat and remain in semi-solid condition at normal temperatures. Such a material not only imparts desirable sound deadening characteristics to the structure, but serves to effectively unite the insulating material and the protective covering whereby the inner and outer sheets are tied together and the entire assembly held rigidly in place. Such a filling may comprise artificial asphalt, natural asphalt or similar material, it having been found that the desired results are obtained by its use. While such material effectively adheres not only to the insulation, but to the protective sheeting, I have found that it is possible to use a wide variety of different materials by preliminarily coating the inner walls of the metal or other covering sheets prior to the pouring operation. Where preliminary coating is resorted to, I found that a solution of coal tar oils or the like is highly desirable. During the pouring in operation, the frame and platens prevent any possibility of spreading or bulging of the parts and serves to hold the parts in position until the desired binding action is obtained.

For properly centering the finishing sheet 51, the lower platen may be formed with po-

sitioning or guiding stops 63 and the upper platen provided with centering means 64, preferably having inclined lower ends co-operating with the sheet 56 for moving it laterally into exactly the position desired.

From the foregoing, it will be apparent that there is provided a section having permanent characteristics with respect not only to insulating qualities, but as to the positioning of the insulation body. Furthermore, the entire structure is bound together by the filling material whereby possibility of bulging of the finishing sheets is prevented.

If desired, it will be apparent that the invention, instead of being utilized in connection with the pouring of individual sections, may be practiced in the pouring of completely constructed refrigerators, as disclosed, for example, in my copending application, Serial No. 70,308, filed November 20, 1925. It will likewise be apparent that instead of supplying the binding and sealing material to the sections or to the completed unit under pressure, as disclosed herein, the same results may be accomplished by producing a vacuum at the overflow point and insuring a flow of the sealing material by atmospheric pressure. In either case, a pressure differential is utilized for obtaining the desired results. By filling gradually in the manner disclosed and by inclining during the filling operation, filling of all of the voids is insured, inasmuch as trapping of any air is prevented.

I have found that in certain types of compound wall structures material such as sodium silicate may be effectively utilized in place of material of the type hereinbefore referred to. Where such material is used, it will be apparent that the necessity of employing heat is obviated.

Certain of the features herein disclosed are made the subject matter of my Patent 1,608,324 of November 23, 1926.

Certain advantages of the present invention arise from the provision of an improved method for securing preformed insulating material and protective sheathing together.

Other advantages of the invention arise from the method of protecting the insulating material against moisture deposition by reason of air circulation.

Still other advantages of the invention arise from the method of constructing a compound wall structure, particularly adapted for insulation purposes and having permanency both with respect to structure and insulating characteristics.

Still further advantages arise from the method of constructing a refrigerator in which a supplemental frame is not required, and from the method of holding a structure against distortion during the filling operation.

I claim:

1. The method of forming compound wall

structures, comprising providing an insulating body and a protective sheathing, maintaining the same in spaced relation, filling the voids between said body and sheathing by binding material, and securing the proper distribution of said binding material by pressure differential, substantially as described.

2. In the method of constructing compound wall structures, the steps comprising maintaining an insulating body and a protective sheathing in spaced relation but in inclined position, and gradually filling the space by applying a filling material at the lower end thereof, substantially as described.

3. In the method of constructing compound wall structures, the steps comprising providing an insulating body and a protective sheathing, maintaining said body and sheathing in spaced relation, flow-filling the space between said body and sheathing, and insuring the escape of air during said filling operation, substantially as described.

4. In the method of constructing compound wall structures, the steps comprising positioning an insulating body, substantially covering at least one side of said body with a protective sheathing, maintaining said protective sheathing in substantially uniformly predetermined spaced relationship from said insulating body to provide a space of substantially uniform dimensions therebetween, and then securing said body and sheathing together by substantially filling said space by pouring heated material therein.

5. In the method of constructing compound wall structures, the steps comprising positioning an insulating body, substantially covering at least one side of said body with a protective sheathing, maintaining said sheathing and body in such spaced relationship as to provide a space therebetween substantially continuously extending throughout the area of the covering and body, and thereafter substantially completely filling said space by flowing material into said space.

6. In the method of constructing compound wall structures, the steps comprising maintaining a protective sheathing and insulating body in predetermined spaced relationship to provide a space therebetween, and thereafter completely filling said space to prevent circulation of air therein by pouring filling material into said space.

7. In the method of constructing compound wall structures, the steps comprising assembling an insulating body, a protective sheathing and spacing means in such manner as to maintain the sheathing out of contact with said body except through the medium of said spacing means, and thereafter completely filling the space between said sheathing and body by pouring heated material therebetween.

8. In the method of constructing com-

pound wall structures, the steps comprising assembling an insulating body and a protective sheathing in spaced relation, sealing the major portion of the space between said sheathing and body at the edges thereof to provide a relatively small inlet and outlet to the space therebetween, and completely filling said space by pouring material through said inlet until it passes from the outlet substantially as described.

In testimony whereof I have hereunto set my hand.

LUTHER L. KNOX.

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