April 8, 1930. W. H. D'ARDENNE 1,753,774

SEALING DOOR

Filed Feb. 10, 1927 2 Sheets-Sheet 1

Fig. 1.

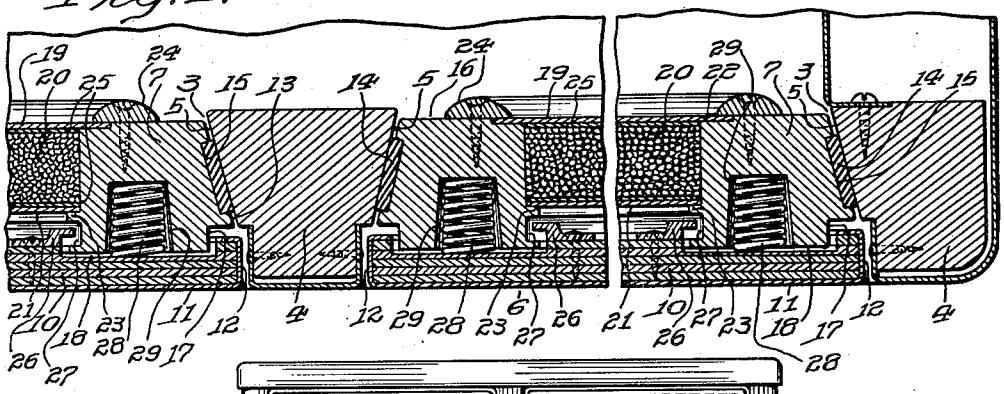

Fig. 2.

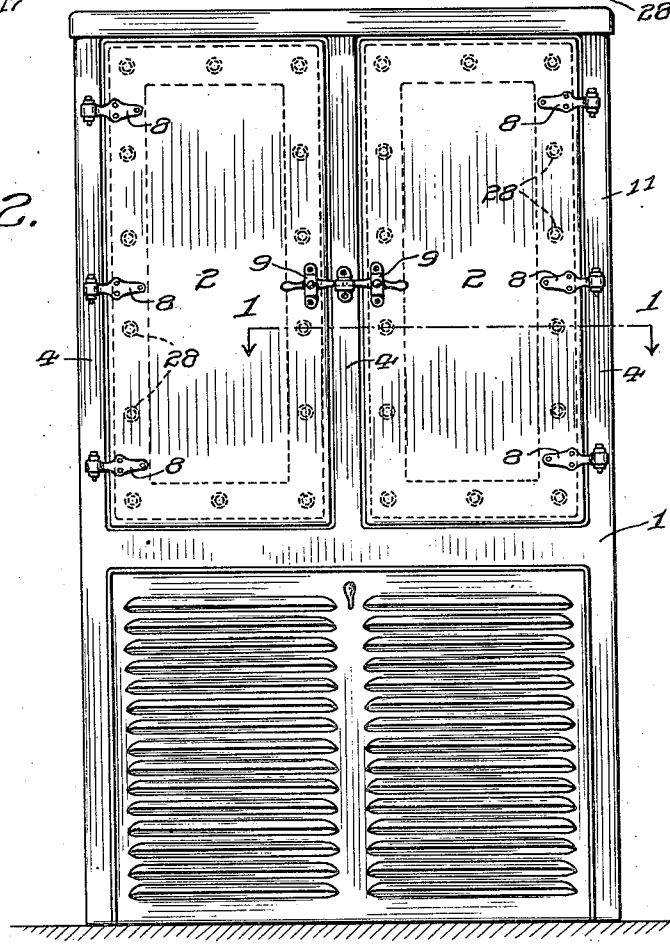

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Fig. 3.

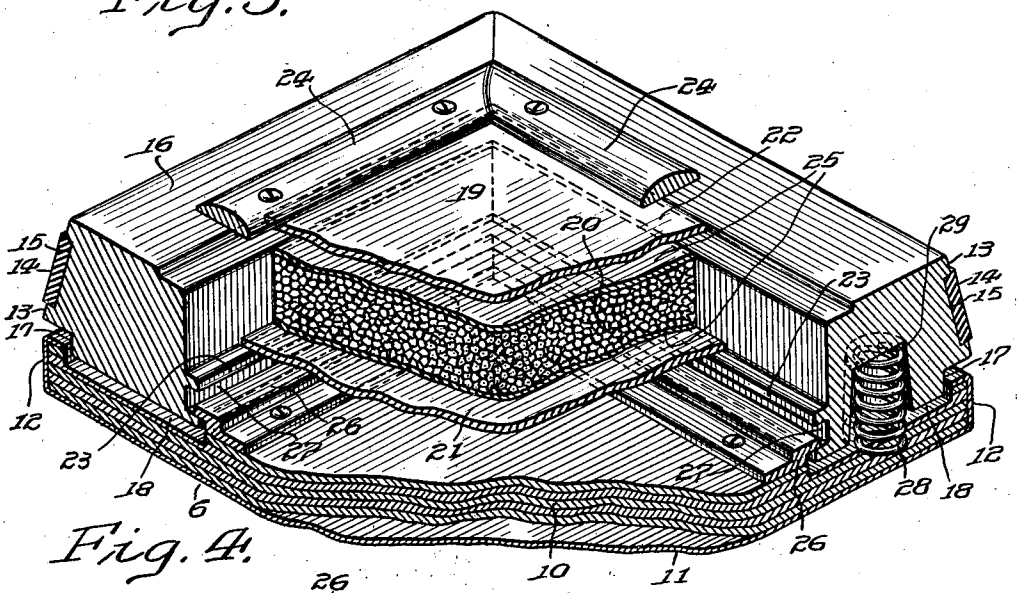
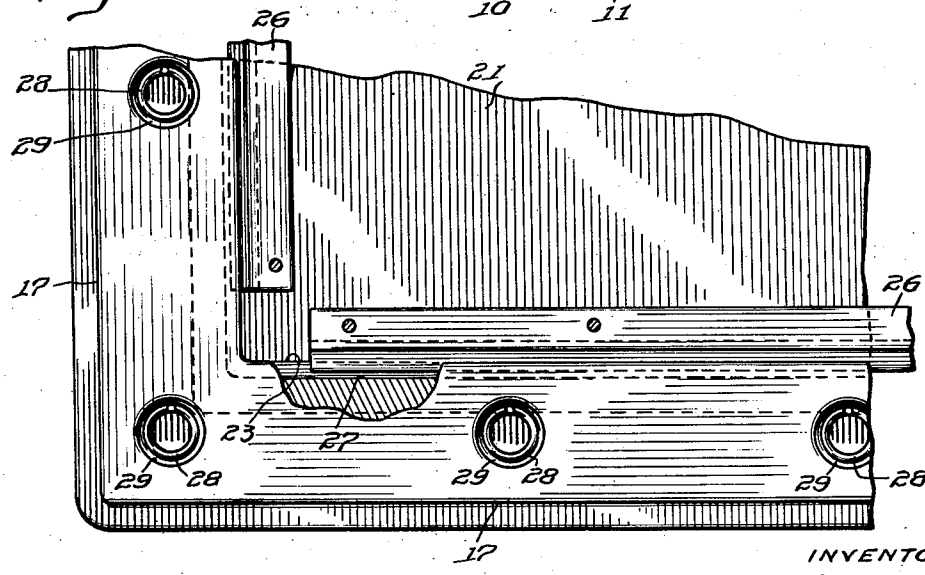


Fig. 4.



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Patented Apr. 8, 1930 1,753,774

UNITED STATES PATENT OFFICE

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SEALING DOOR

Application filed February 10, 1927. Serial No. 167,093.

The present invention relates to doors for closing a doorway so that it is sealed hermetically, and aims to provide a device of this character which is particularly efficient in operation and effects a tight joint, which may be easily and quickly opened and closed as occasion requires, and which is simple, durable and strong in construction and not likely to get out of order.

An object of the invention is to provide a sealing door, which, when closed, automatically adjusts itself to its seat within the doorway to compensate for wear, for expansion, contraction or other distortion, of or for variation from proper alinement due to inaccuracy in the manufacture or assembly of the parts.

Another object of the invention is to provide a sealing door which, when closed, is held under continuous yielding pressure that forces it inwardly against its seat and maintains it firmly and evenly in contact therewith, so that the door fits the doorway tightly at all points and seals the same hermetically.

A further object of the invention is to provide a door of this character which is particularly adapted for use in refrigerators, it having been found that loose joints around the doors are one of the prime causes of the transfer of heat to the refrigerating chambers and that sealed doorways are therefore essential in order to maintain maximum efficiency. Other objects will appear hereinafter or will be obvious.

In accordance with this invention, the door comprises an outer portion or unit which is movably mounted in relation to the doorway, as by being hinged to the frame thereof, and is adapted to be secured in closed position across the same; an inner portion or unit carried by said outer portion and flexibly mounted thereon for limited "floating" movement with respect thereto so as to have play in any direction substantially parallel to the outer portion as well as toward and away from the same; and springs interposed between the inner and outer portions of the door and pressing the former bodily away from the latter and adapted, when the door is closed, to force such inner portion yieldingly against its seat and hold it firmly and evenly thereon to make a tight joint.

The invention includes the various features of construction, combinations of elements and arrangements of parts, which are exemplified in the construction hereinafter set forth and illustrated in the accompanying drawings forming a part of this specification.

Referring to the drawings, in which similar reference numerals indicate similar parts throughout the several views,—

Fig. 1 is a horizontal sectional view, partly broken away, illustrating one embodiment of my invention, as applied to a refrigerator cabinet, the section being taken on the line of 1—1 of Fig. 2 and the hinge being omitted for the sake of clearness.

Fig. 2 is a front elevation thereof.

Fig. 3 is an enlarged fragmentary perspective view showing the details of construction of the door.

Fig. 4 is an enlarged detail view in front elevation, partly broken away, of the rear portion of the door, with the front portion removed.

In the present embodiment of the invention a refrigerator cabinet 1 is shown as equipped with my improved sealing doors 2 which are adapted to close respectively the doorways 3 that afford access to the interior of the cabinet. The opposed walls of the frame 4 of each doorway are preferably bevelled, as shown, so as to converge inwardly and form a tapered seat 5 for the door. The cabinet 1 may be of any well-known or suitable form and the details of its construction form no part of the present invention.

Each door 2 comprises outer and inner portions or units, designated 6 and 7 respectively. The outer portion is mounted, as by hinges 8 attached to the frame 4 to move in a fixed path into open and closed positions, and is adapted to be secured in closed position by a suitable catch or lock 9. In the present instance the outer portion 6 is of a size to fit freely within the doorway with its outer surface flush with the front of the cabinet, but this is not necessary and, if desired, the outer portion may be somewhat larger than the doorway and lie wholly or

partly outside of the same and overlap the front wall of the cabinet. This outer portion of the door may be formed of wood or any other suitable material, and may have a laminated structure and consist, for instance, of a plurality of wood plies 10, and a sheet metal facing or sheathing 11 on the outer face, the sheathing having marginal flanges 12 which embrace the edges of the wood plies 10 and overlap the inner face of the outer portion 6.

The inner portion 7 of the door is carried by and located on the inner face of the outer portion 6, and serves as a sealing plug, being of a size and shape to fit snugly within the doorway and having its periphery bevelled, as indicated at 13, to taper inwardly correspondingly to the tapered seat 5. A suitable gasket 14 is interposed between the seat 5 and the periphery of the inner portion 7 and may be supported in a groove 15 in the latter. This inner portion of the door comprises a continuous frame 16 of rectangular or any other suitable shape, which is preferably rabbeted adjacent its outer face, as indicated at 17, and has such rabbeted portion received in a continuous groove 18 in the inner face of the outer portion 6.

Extending across and closing the opening through the frame 16 is a panel 19, which, when the door is employed in a refrigerator, as in the present instance, embodies cork or other suitable heat insulating material 20. The insulating material may be confined between plates 21 and 22, the former of which abuts against and is supported on an inwardly facing shoulder 23 extending around the inner surface of the frame 16, while the plate 22 has its marginal portions overlapping the inner face of the frame and secured thereto as by means of moulding or beading strips 24. If desired, a layer 25 of waterproof paper or the like may be interposed between the insulating material 20 and the respective plates 21 and 22.

The inner portion 7 is flexibly mounted on the outer portion 6 of the door for limited "floating" movement with respect thereto so as to have play in any direction substantially parallel to the outer portion 6 as well as toward and away from the same. As one means of accomplishing this, Z-bars 26 are secured to the inner face of the outer portion 6 within the frame 16 and project into a groove 27 extending around the inner surface of the latter between the shoulder 23 and the outer face of such frame, the width and depth of the groove being such that the Z-bars fit loosely therein and afford the inner portion 7 the limited "floating" movement above referred to and at the same time retain it in assembled relation to the outer portion 6 and against removal therefrom.

It is to be noted that the groove 18 is of greater width than the rabbeted portion 17 of the frame 16 so as not to interfere with the limited "floating" movement of the inner portion 7 in any direction substantially parallel to the outer portion 6. Preferably, the arrangement is such that there is the same range of play between the rabbeted portion 17 and the sides of the groove 18 as there is between the free edges of the Z-bars 26 and the bottom of the groove 27, so that when the inner portion 7 is moved to the limit of its play in any direction substantially parallel to the outer portion 6 there is contact not only between the bottom of the groove 27 and one or more of the Z-bars 26 but also at certain points between the rabbeted portion 17 and the side walls of the groove 18. This is desirable in that it relieves the Z-bars of strain, reduces the wear between the same and the frame 16, and causes the outer portion 6 directly to bear part of the weight of the inner portion 7 when the door is open. The range of play of the inner portion 7 away from the outer portion 6 may be sufficiently limited, as shown, to prevent the rabbeted portion 17 from being entirely withdrawn from the the groove 18.

Yielding pressure is applied to the inner portion 7 to force it away from the outer portion 6, as by means of a plurality of coiled expansion springs 28 interposed therebetween at suitable intervals and seated at their inner ends within sockets 29 formed in the frame 16, the outer ends of the springs bearing against the bottom wall of the groove 18. These sockets preferably flare outwardly and away from the peripheries of the springs whereby to prevent the springs, from binding therein and to afford them lateral play in the movement of the inner portion 7 substantially parallel to the outer portion 6. When the inner portion is yieldingly supported in spaced relation to the outer portion by the springs 28, such arrangement together with the coupling above described between the portions, permits the inner portion to have free, limited, universal movement relative to the outer portion, if this should be necessary to insure a tight fit within the doorway.

In operation, when my improved sealing door is swung inwardly to closed position the outer portion 6 thereof is secured in fixed position across the doorway by means of the catch 9. The inner portion of the door extends inwardly within the doorway and by virtue of its "floating" mounting has limited play in any direction substantially parallel to the outer portion 6 as well as toward and away from the same, so as to compensate for wear, for contraction, expansion or other distortion, or for variation from proper alinement due to inaccuracy in the manufacture or the assembly of the parts. The door thus adjusts itself automatically to the doorway to permit the inner portion to fit snugly within the tapered seat 5 and serve as a sealing plug. The expansion springs 28 are com-

pressed as the inner portion 7 is swung into engagement with the tapered seat 5 and apply continuous yielding pressure to such inner portion to hold it firmly and evenly in contact with the seat and tightly thereagainst at all points so as hermetically to seal the doorway. It will be noted that the arrangement is such that it does not interfere with the door being easily and quickly opened and closed as occasion requires and that manual adjustment or setting of the parts is avoided. The construction is not only particularly efficient but also simple, strong and durable and not likely to get out of order.

With the present embodiment of the invention the parts of the door may be conveniently assembled by seating the springs 28 within the respective sockets 29; placing the frame 16, without the panel 19, against the inner face of the outer portion 6; and securing the Z-bars 26 to the inner face of such outer portion in proper relation to the groove 27, access for this last-mentioned step being afforded through the open frame 16. The panel 19 is thereupon inserted within the frame against the shoulder 23 and secured in position by the moulding or beading strips 24.

It is to be understood that various changes may be made in the above construction and that the invention may be embodied in many different forms, without departing from the spirit of the invention and its scope as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. A sealing door comprising inner and outer portions and a coupling between the inner and outer portions mounting the former on the latter for limited floating movement in any direction relative thereto.

2. A sealing door comprising inner and outer portions, and a coupling between the inner and outer portions mounting the former on the latter for limited free play in any direction parallel thereto.

3. A sealing door comprising inner and outer portions, yielding means between said portions, and means for mounting the inner portion on the inner face of the outer portion, for limited, free play in any direction parallel thereto.

4. A sealing door comprising inner and outer portions, the inner portion including a frame and a removable panel closing the same, and means securing the inner portion to the inner face of the outer portion for limited, free play relatively thereto, such means being housed within the frame and between said outer portion and the removable panel.

5. A sealing door comprising inner and outer portions, one of such portions being formed with a groove, and a member secured to the other portion and engaged in the groove to mount the inner portion on the inner face of the outer portion, said member having limited, free play in the groove in a direction parallel to said outer portion.

6. The combination with a door-frame having a seat extending therearound within the doorway, of a sealing door comprising an outer portion mounted to move in a fixed path into open and closed positions, an inner portion carried by said outer portion and adapted, in closed position, to fit within the door-frame and snugly engage said seat, and means mounting said inner portion on said outer portion for limited, free play in any direction parallel thereto.

7. A sealing door comprising inner and outer portions, means for mounting the inner portion on the outer portion for limited floating movement both toward and away from such outer portion, and parallel thereto, and yielding means between said inner and outer portions normally forcing the former away from the latter.

8. The combination with a door-frame having a tapered seat, of a sealing door comprising an outer portion mounted to move in a fixed path into open and closed positions, a tapered inner portion carried by the outer portion and adapted in closed position to fit within said seat, and means mounting the said inner portion on said outer portion for limited, free play in any direction parallel thereto, to permit the inner portion to adjust itself with respect to and snugly engage said seat.

9. The combination with a door-frame having a tapered seat extending around the inner surface thereof, of a sealing door comprising an outer portion movably mounted with respect to the door-frame to swing to open and closed positions, an inner portion carried by the outer portion and adapted to fit snugly within the door-frame with its periphery engaging said seat, said inner portion having limited floating movement both toward and away from said outer portion, and parallel thereto, to adjust itself to said seat, and springs interposed between the inner and outer portions yieldingly forcing the former away from the latter and into contact with said seat.

10. A sealing door comprising inner and outer portions and a coupling between the inner and outer portions mounting the former on the latter for universal movement relative thereto.

In testimony whereof, I have signed my name to this specification.

WALTER H. D'ARDENNE.