March 30, 1965 A. H. BROMANN, JR 3,175,254

DOOR FOR REFRIGERATOR AND THE LIKE

Filed Jan. 22, 1962 2 Sheets-Sheet 1

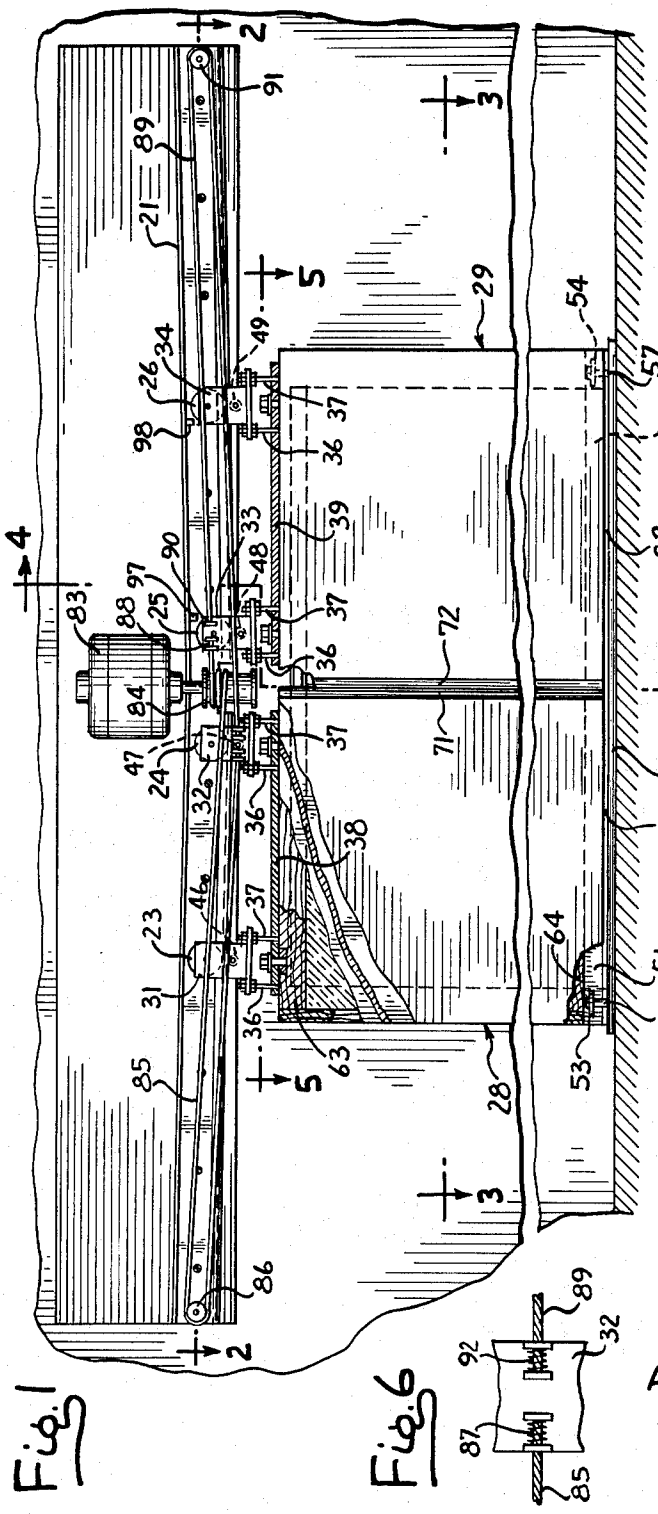


Fig. 1

Fig. 6

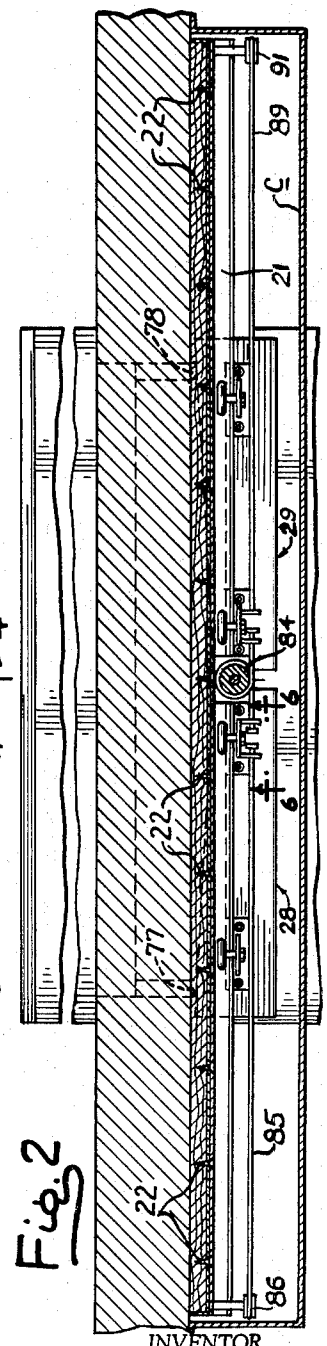


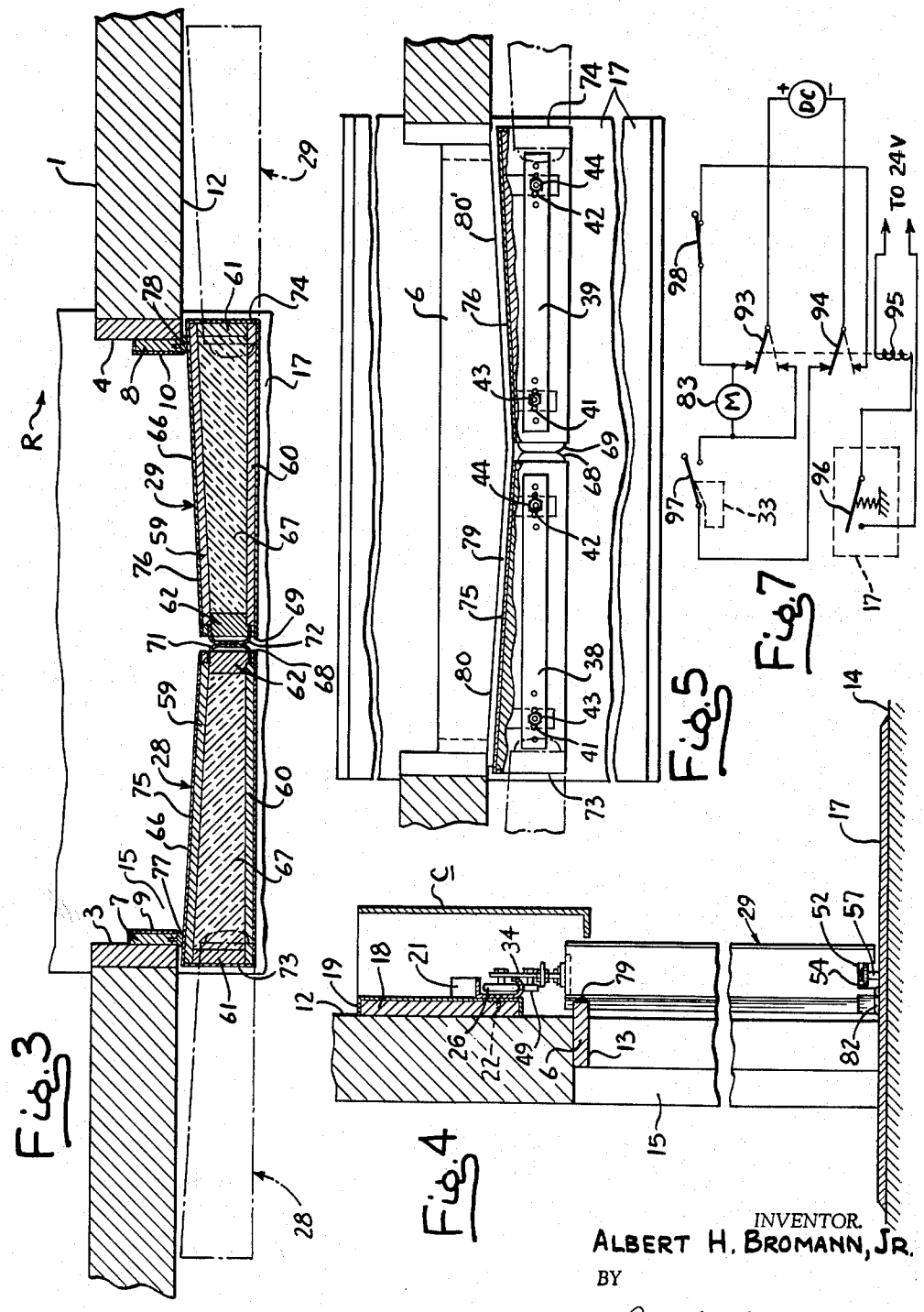
Fig. 2

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DOOR FOR REFRIGERATOR AND THE LIKE

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This invention relates generally to doors, and, more particularly, to doors for refrigerators and the like.

In cold storage rooms, lockers, or other types of "walk in" refrigerated rooms, it is desirable that the doors opening thereinto be constructed in a manner to provide ease of opening and closing, reliability of operation, and a minimum of heat loss, all commensurate with reasonable cost. Where repeated access to the room must be had for a number of hours at a time, such as in frozen food or meat storage rooms, super markets, warehouses and the like, two doors or sets of doors are sometimes used. One door, which is the outermost of the two, is generally quite heavy, well insulated, and is intended to be opened and closed only once per day. The auxiliary or inner door may consist of a pair of relatively light swinging door members that are intended to be easily opened repeatedly throughout the time during which the outer door is open. These auxiliary doors are, however, subject to considerable wear, particularly if motorized carts are constantly bumped against those doors to open them. Under such conditions frequent repair or replacement of door members is required. Moreover, since these door members are not well insulated and do not form a satisfactory seal across the door opening, their use results in a substantial heat loss.

Overhead doors have, of course, been installed as closures for refrigerated and non-refrigerated storage spaces alike. However, doors of this type are cumbersome and slow to open and close even when power operated with the result that they are not usually suitable where frequent access to the storage area is required. Moreover, those doors often require relatively large motors to drive them.

It is an object of the present invention to provide a novel door assembly that is useful as a closure for variety of rooms or storage areas, but is particularly suitable as a closure for walk-in type refrigerated spaces.

It is a further object of the present invention to provide a door assembly of the type stated that forms an effective seal across the door opening when the doors are closed, thereby minimizing thermal losses therethrough. At the same time, the door assembly of the present invention eliminates the need for auxiliary doors of the type heretofore used.

It is an additional object of the present invention to provide a door assembly of the type stated in which the gaskets that form a seal between the doors and the door opening are subjected to a minimum of wear as the doors are opened and closed.

It is also an object of the present invention to provide a door assembly of the type stated that includes a pair of power driven doors that are quickly and easily opened and closed, and wherein the doors do not require large amounts of power to drive them.

It is another object of the present invention to provide a door assembly of the type stated where the doors are automatically operated and wherein the doors are kept open only long enough for persons to pass through the door openings, thereby minimizing the time interval during which the doors stay open.

The attainment of the above and further objects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawing forming a part thereof.

In the drawing:

FIG. 1 is a front elevational view, partially broken away and in section, of a door assembly constructed in accordance with and embodying the present invention;

FIGS. 2, 3, 4 and 5 are fragmentary sectional views taken along lines 2—2, 3—3, 4—4 and 5—5 respectively of FIG. 1;

FIG. 6 is a fragmentary elevational view, on an enlarged scale, as seen from line 6—6 of FIG. 2; and

FIG. 7 is a schematic of the electrical circuit that forms part of the present invention.

Referring now in more detail and by reference characters to the drawing, which illustrates a preferred embodiment of the present invention, 1 designates a building wall, such as the insulated wall of a refrigerated storage room R. Mounted on the wall 1 and forming a part thereof is a door frame 2 having vertical frame members 3, 4 and a horizontally extending top frame member 6 that extends transversely between the upper ends of the vertical frame members 3, 4. Preferably, the vertical frame members 3, 4 include upstanding boards 7, 8, the boards 7, 8 being finished by being sheathed in plastic or sheet metal 9, 10. The sheathed boards 7, 8 are located approximately flush with the outer surface 12 of the wall 1, and the boards 7, 8, together with the lower margin 13 of the top member 16 and the building floor 14 define a door opening 15. Mounted on the floor 14 is a rubber pad 17 that lies on either side of the door threshold and projects a substantial distance beyond the wall 1 on either side thereof. Furthermore, the pad 17 may have a width approximately equal to or slightly greater than the width of the door opening 15.

Rigidly secured to the outer surface 12 of the wall 1 and above the door opening 15 is a mounting board 18 which may, if desired, be provided with sheathing 19. A trackway 21 is suitably secured to the mounting board 18 in any suitable manner as, for instance, by a plurality of screws 22. As best seen in FIGS. 1 and 4, the trackway 21 is above and is considerably wider than the door opening 15. Furthermore, the trackway 21 inclines slightly downwardly from each of its ends 24, 25 toward the center of the door opening 15.

Mounted in the trackway 21 are rollers 23, 24, 25, 26 from which a pair of doors 28, 29 are suspended for opening and closing of movement across the door opening 15. The rollers 23, 24, 25, 26 are carried by roller hangers 31, 32, 33, 34 which are each adjustably secured by bolts 36, 37 to top plates 38, 39 on the doors 28, 29. The top plates 38, 39 are, in turn, provided with slots 41, 42 (FIG. 5) for receiving bolts or screws 44, 45, whereby the top plates 38, 39 may be adjustably secured to the doors 28, 29. Also secured to the hangers 31, 32, 33, 34 are rollers 46, 47, 48 and 49 which bear against the underside of the trackway 21. The lower ends of the doors 28, 29 are provided with longitudinally extending grooves 51, 52 for receiving bearing rollers 53, 54, the latter being mounted on pins 56, 57 that project upwardly from the floor or door threshold adjacent to the lateral sides of the door opening 15.

The doors 28, 29 may each be fabricated in any suitable manner as, for instance, by a plurality of panels 59, 60, 61, 62, 63, 64, and the doors 28, 29 may be clad with a covering 66 of plastic, sheet metal, wood, or the like. The inside of each door 28, 29 may be filled with a suitable heat insulating material 67. The facing ends 68, 69 of the doors 28, 29 have U-shaped rubber gaskets 71, 72 secured thereto, and these gaskets 71, 72 extend from the tops to the bottoms of the doors 28, 29. As best seen in FIGS. 3 and 5, the doors 28, 29 are narrower at their facing ends 68, 69 than at their remote ends 73, 74, this being accomplished by tapering the door sides 75, 76, and for purposes presently more fully appearing.

Stapled or otherwise securely fastened to the surfaces of the boards 7, 8 that face the tapered sides 75, 76 and extending substantially throughout the height of the door opening 15 are gaskets 77, 78 that are preferably of yieldable rubber covered cotton. A head gasket 79, similar to gasket 78, is likewise mounted along those surfaces 80, 80' of the top frame member 6 that face the tapered sides 75, 76. As best seen in FIG. 5, the surfaces 80, 80' as well as the portions of the head gasket 79 mounted thereon are substantially parallel to the tapered door sides 75, 76. On their lower ends, the doors 28, 29 have flat rubber gaskets 81, 82 that are edgewise flush with the lower margins of the tapered sides 75, 76.

Secured to the mounting board 18 is an electric motor 83 that drives a drum 84 located adjacent to the trackway 21. If necessary, a part of the trackway 21 may be removed to provide clearance for the drum 84. A cable 85 is wrapped around the drum 84 and is trained over a pulley 86 located at one end of the trackway 21. One end of the cable 85 is connected through a cable tension spring 87 (FIG. 6) to the roller hanger 32. The other end of the cable 85 is secured at 88 to the roller hanger 33. A second cable 89 is likewise secured at 90 to the roller hanger 33, and is trained over a pulley 91 mounted at the other end of the trackway 21. The remaining end of the cable 89 is secured through a cable tension spring 92 to the roller hanger 32. It will be apparent from the foregoing that when the motor 83 is rotated in one direction, the doors 28, 29 will move along planar paths from the closed positions, shown in full lines in FIGS. 3 and 4, to the open positions as shown in broken lines therein. Similarly, reverse rotation of the motor 83 will return the doors 28, 29 from their open to their closed positions. Also, since the trackway 21 is inclined the doors 28, 29 are elevated as they are opened and lowered as they are closed.

If desired, a cover C may be suitably mounted on the wall 1 to conceal the trackway 21, motor 83 and related mechanism.

A control circuit of the type shown in FIG. 7 may be utilized for automatically opening and closing the doors 28, 29. To this end, the motor 83 is connected to a relay having contact arms 93, 94 to a suitable D.C. source. The contact arms 93, 94 are normally in the full line positions shown in FIG. 7, and are actuated by a relay coil 95 that is energized to a low voltage source, such as the 24 volt source shown. A normally open switch 96 is located in the floor pad 17 so that the switch 96 is closed when the weight of a person or vehicle is on the floor pad 17 on either side of the door opening 15, that is to say, whether inside or outside of the storage room R. Normally, closed limit switches 97, 98 are provided in the motor circuit and are mounted on the trackway 21 for actuation by one of the roller hangers 33.

When it is desired to open the doors 28, 29 to enter the storage room, the person or vehicle, as the case may be, moves onto the floor pad 17, closing the switch 96 to energize the coil 95 and thereby shift the contact arms 93, 94 to their dotted line positions shown in FIG. 7. Current is then supplied to the motor 83 causing it to rotate and shift the doors 28, 29 to their open position. When the doors 28, 29 have reached their fully open positions, the roller hanger 33 will engage the limit switch 98, opening it, shutting off the motor 83, whereupon the doors 28, 29 will remain in their open positions. The person or vehicle may then pass through the door opening 15, and the doors 28, 29 will remain open so long as the person or vehicle is on the floor pad 17. However, when the person or vehicle leaves the floor pad 17 inside of the storage room, the switch 96 is opened which causes the relay coil 95 to become de-energized, whereupon the contact arms 93, 94 return to their full line positions and energize the motor 83. Since the limit switch 97 closed when it was disengaged by the hanger 33 upon opening of the doors 28, 29, the circuit to the motor 83 will now be closed and current will be supplied thereto so as to move the doors 28, 29 back to their closed positions. The

motor 83 is de-energized when the limit switch 97 is opened, at which time the doors 28, 29 have reached their closed positions.

If the power to the motor 83 should fail the doors 28, 29 may be manually pulled open since the friction in the drive assembly is relatively low, and the trackway incline is slight. In fact, the present invention contemplates elimination of the drive motor in some types of installations and the provision of handles on the doors 28, 29 so that they may be conveniently opened manually.

When the doors 28, 29 are open the tapered door sides 75, 76 will be spaced from the gaskets 77, 78, 79. Similarly, the bottom gaskets 81, 82 will be slightly above the floor pad 17 due to the fact that the doors 28, 29 are raised when opened. However, when the doors 28, 29 are closed, the tapered sides 75, 76 will engage the gaskets 77, 78, 79 as the doors reach their closed positions so that the gaskets 77, 78, 79 are then wedged between the tapered sides 75, 76 and the door frame 2. At the same time the bottom gaskets 81, 82 are pressed into engagement with floor pad 17, and the end gaskets 71, 71 are pressed into engagement with each other. The several gaskets will thus provide an effective seal across the door opening 15 when the doors are closed. Furthermore, since the gaskets 77, 78, 79 are spaced from the doors 28, 29, and gaskets 81, 82 are spaced from the floor pad 17 except when the doors 28, 29 are in or substantially reach closed positions, these gaskets are subject to only slight abrasive wear as the doors 28, 29 are repeatedly opened and closed. The present invention, therefore, provides an arrangement that substantially prolongs gasket life.

In compliance with the requirements of the patent statutes, I have herein shown and described a preferred embodiment of the invention. It is however, to be understood that the invention is not limited to the precise construction herein shown, the same being merely illustrative of the principles of the invention. What is new and desired to be secured by Letters Patent is:

1. In a door assembly, a door frame having a top and sides and an opening, a pair of doors each having a tapering side, means mounting the doors for shifting movement toward and away from each other along paths that are parallel to the general plane of the door frame and at acute angles to said tapering sides to move the doors to and from open and closed positions across said opening, said doors having their narrower ends facing each other, and gasket means between the frame and tapered sides of the doors and being mounted on said top and sides of the door frame and spanning the space between the doors and frame when the doors are closed, the parts of the gasket means on the top frame being generally parallel respectively to the tapered sides of the doors.

2. In a door assembly, a door frame having spaced upstanding side frame members and a top frame member that extends between the upper ends of the side frame members, threshold means extending between the lower ends of the side frame members, said frame members and threshold means defining a door opening, a pair of doors across the opening and having facing ends, means for suspending the doors for movement toward and away from each other along inclined paths lying in the same general plane, said general plane being parallel to the mid-plane of the door frame, gasket means mounted on the side frame members and the top frame member and interposed between said frame members and doors, said doors each having a side that is tapered toward its facing end and forms an acute angle with said general plane and is presented toward the door frame for wedging engagement with the gasket means on the side and top frame members as the doors approach their closed positions, the top frame supporting the gasket means thereon in positions parallel respectively to the tapered sides.

3. In a door assembly, a door frame having spaced upstanding side frame members and a top frame member

that extends between the upper ends of the side frame members, threshold means extending between the lower ends of the side frame members, said frame members and threshold means defining a door opening, a pair of doors having facing ends with gasket means on each of the facing ends, said doors each having a side that tapers toward its facing end, said tapered sides each being presented toward said door opening, gasket means mounted on each side frame member adjacent to the door opening and presented toward said tapered sides, said gasket means each extending upwardly substantially from the threshold means to the top frame member, gasket means mounted on the top frame member and extending transversely substantially from one side member to the other and having a contour corresponding substantially to the taper of the sides of the doors, gasket means on the lower ends of the doors, and means including inclined trackway means above the door opening and substantially parallel to the mid-plane of the door opening for suspending the doors

across the opening for movement in substantially the same general plane toward and away from each other with said general plane being substantially parallel to the said mid-plane and at angles to said tapered door sides, said doors in open position being spaced from all of said gasket means on the door frame and engaging them upon the doors substantially reaching closed position with said upwardly extending and transversely extending gasket means being wedged between the doors and frame, the gasket means on the facing ends of the doors engaging, and the gasket means on the lower ends of the doors engaging the threshold means.

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