Aug. 27, 1963 D. R. VORIS 3,101,776

AIRTIGHT COOLER DOOR

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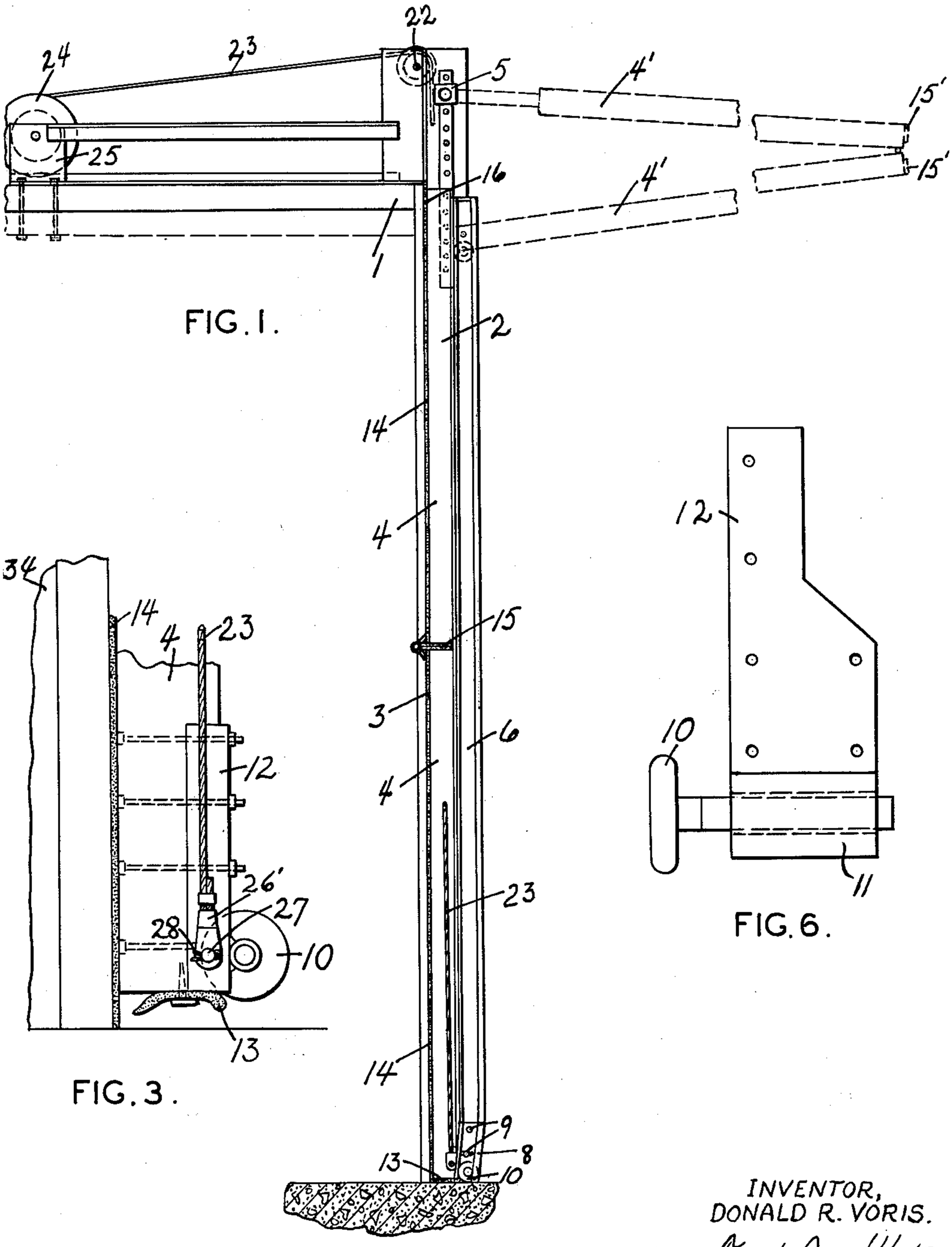

FIG. 1.

FIG. 3.

FIG. 6.

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FIG. 2.

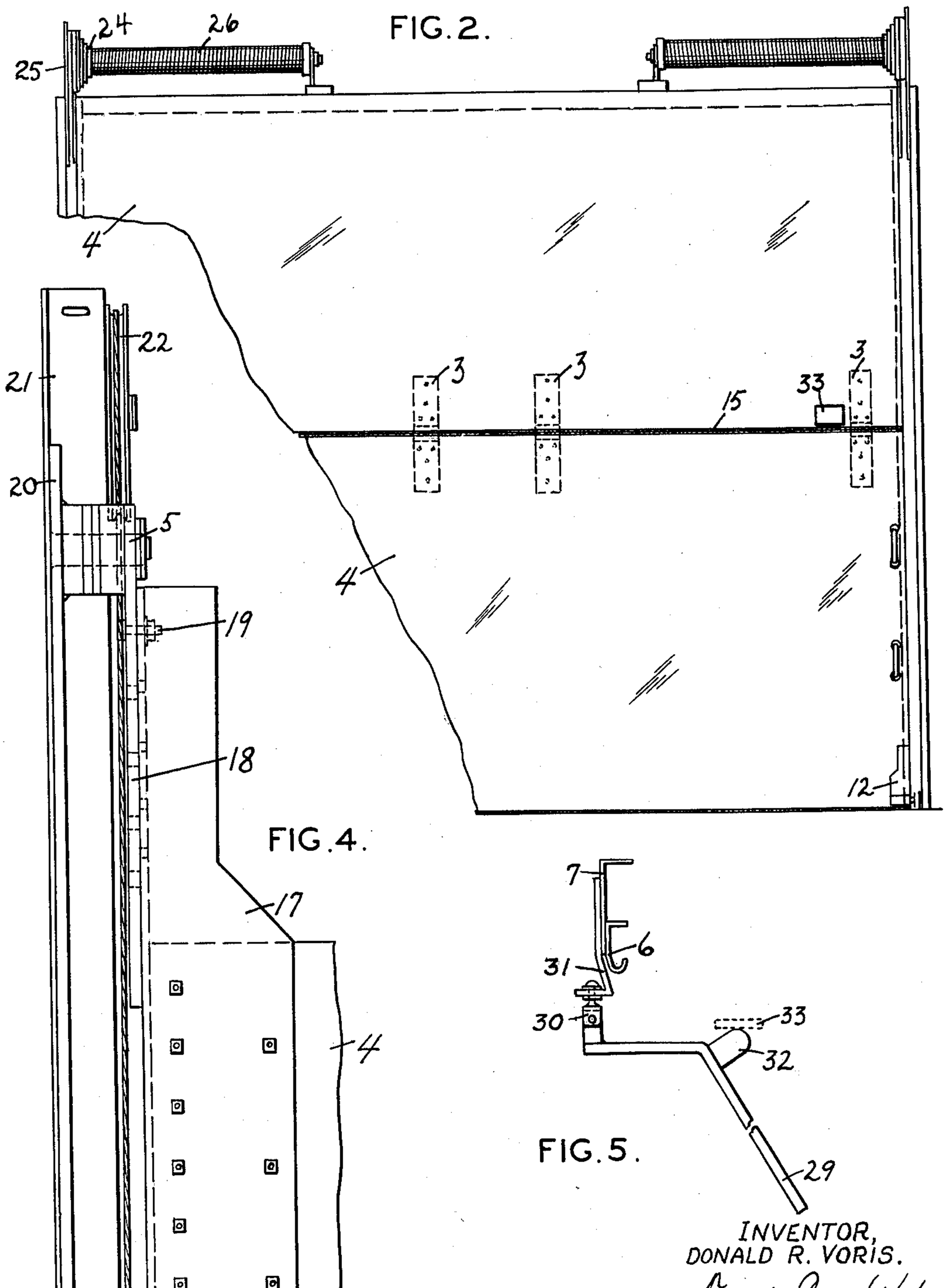

FIG. 4.

FIG. 5.

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AIRTIGHT COOLER DOOR

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1 Claim. (Cl. 160—40)

This cooler door is for use with a cooler room, which customarily is about the size of a twelve-foot cube. According to my design, a light, modular structure of this size can be cheaply built inside a warehouse to provide a cold room in which frozen foods, cold drinks, and the like may be maintained at a given temperature. It is a simple matter to make such a cooler structure airtight on the sides which are never opened and to attach a refrigeration unit to cool the inside of the structure or room. However, it soon becomes apparent that the work load imposed upon the refrigeration unit is greatly increased if the door through which the room is loaded does not fit tightly.

According to my design a counterbalanced, vartically folding door is made of the whole front side of the room, which means that a truck can be backed into the room during the loading procedure. Such a relatively large size also requires that there be relatively large amounts of sealed edges on the loading door. Ideally, a counterbalanced, vertically folding door should be sealed airtight so that the refrigeration unit can work with an absolutely minimum leakage. In this way the most efficient operation of the room as a cooler can be obtained.

The large size of the door with such requirements has previously made such a construction impossible to refrigerate efficiently. Experiments have been made with large doors which have been laboriously sealed around all the edges of the door; however, breaking the seal fully each time that the cooler must be entered and then re-sealing it is too time-consuming.

One of the principal advantages of my invention is that the door sealing construction is positive and airtight.

Another of the principal advantages is that the construction may be sealed and unsealed and re-sealed just as quickly as closing and locking an ordinary door.

A further advantage of my invention is that the door and seal constructions are arranged so that the door is not cumbersome and is easy to move, in spite of the relatively huge size of the door. It must be remembered that such a door is approximately twelve feet square, although I have designed larger doors for such constructions, and that, although relatively huge masses are involved, the action of the door is simple and easy for one person to operate.

An additional advantage of my invention over the present practices in that the sealing of the door is performed as a part of the action of closing the door, and that the mass of the door aids this action of sealing. The effect of this is to make the sealing positive and certain.

A still further advantage of my invention is that the sealing is done through compression of rubber elements throughout. The rubber seal elements act like a rubber gasket and the positive sealing action is so efficient that tests performed in a forty mile wind have conclusively shown that no leakage at the seal element occurs.

These and other advantages resulting from the construction, will be apparent to those skilled in the art from a study of the specification and the drawings.

In the drawings:

FIGURE 1 is a sectional elevation through the cooler door, illustrating the rubber seals at the jambs and head, as well as the sloping track at the foot of the door.

FIGURE 2 is a front elevation of the door.

FIGURE 3 is a fragmentary detail view of a bottom corner of the door.

FIGURE 4 is a fragmentary detail view of the vernier adjustment at the upper left hand side of the door.

FIGURE 5 is a fragmentary detail view of one of the latching levers which locks the door in firm sealing engagement.

FIGURE 6 is a detail fragmentary view of the roller mounting arrangement.

In the FIGURES, **1** represents the roof of the cooler, which is a room consisting of two side walls, a back wall, and a roof, all constructed of insulating materials and sealed at all crevices with tapes or caulking. The door is represented by **2**. It is seen to consist of two rectangular elements hinged together by the hinges **3, 3**. The rectangular elements of the door are numbered **4, 4**. Above the cooler roof the door is pivoted upon the bearings **5**, one of which is located at each side of the door.

Parallel to the closed position of the door, that is projecting vertically in FIGURE 1, is the track **6**. This track **6** is three inches wide and formed of a C-shaped steel member, shown best in cross-section in FIGURE 5. The track **6** is secured in position outside the cooler, that is, to the right of the door in FIGURE 1. The track **6** is mounted in this position by means of the track bracket **7**, best shown in cross-section in FIGURE 5.

The track, and this is an important point, at its lower extremity **8**, in FIGURE 1 is shown to be mounted at an angle departing from the vertical. I prefer to make the track in two sections, the long section **6** and the short bottom section **8**. The bottom section **8** is adjustable in angle by means of the bolts **9, 9**. This adjustment will be explained later.

Riding in the track sections **6** and **8** is the roller **10** which is mounted upon the door, as shown in FIGURE 3, to project slightly below the bottom of the door. The roller is provided with a shaft which is mounted in a tube **11** welded to the bottom plate **12** shown in FIGURE 6.

Nailed to the bottom of the door is the bottom rubber seal element **13**, which is shown to have an open channel-like shape in FIGURE 2. Running continuously along the sides of the door and mounted upon the jambs of the side walls are the rubber side seals **14**. Mounted on the edges of the door elements **4, 4** along the horizontal hinge line of the door is the hinge rubber seal **15**. The head of the door opening is also provided with a head rubber seal **16**, which may be nailed on the inner side of the door or the outer edge of the head. Thus the door is sealed at its top by the head rubber seal **16**, on both sides by the rubber side seals **14**, and at the bottom by the bottom rubber seal **13**. At the hinge line the hinge rubber seal **15** provides sealing.

The top of the door is shown in FIGURE 4 to be provided with a top bracket **17**. The top bracket **17** is mounted to the pivot arm **18** by means of the bolts **19**. Pivot arm **18** is rotatably mounted on the bearing or pintel **5**, which is mounted in position on the top of the roof by the pintel bracket **20**, which is in turn mounted upon the roof bracket **21**.

Also carried by the roof bracket **21** is the cable sheave **22**. In FIGURE 1 the metal cable **23** is shown extending to the cable drum **24** around which it is wrapped and to which it is secured in the customary manner. The cable drum is rotatably mounted at one end on the drum mounting bracket **25**. At the other end the cable drum **24** is rotatably mounted on the spring anchor bracket. Wound upon the cable drum is the spring **26** which is a heavy coil spring common in the art. The spring **26** has as its purpose acting as a counterbalance for the weight of the door. As the door is raised, the coil spring relaxes, and as the door is lowered,

the spring is coiled. The principle is old and is illustrated in Patent No. 1,629,973 issued May 24, 1927, to Rush and Greegor. I prefer to use two coil springs, as shown in FIGURE 2, one wound lefthandedly, and the other wound righthandedly, the reason being that the rotations of the sheaves **22** upon the opposite ends of the door are opposite in sense.

After passing over the sheave **22**, the cable **23** is directed down along the side of the door until it reaches the bottom. At the bottom of the door, FIGURE 3, the cable **23** terminates at a cable thimble **26'**, which is locked on the cable pin **27** by the cotter pin **28**.

At the hinge line of the door, I provide upon opposite sides of the door a pair of latching levers **29**. The latching lever **29** is shown in FIGURE 5 to be mounted upon a joint **30**, the socket of which is integrally mounted upon the joint mounting plate **31**, welded to the track bracket. The latching lever **29** is provided with an integral pressure block **32** which bears against a pressure plate **33** mounted on the door.

In the position shown in FIGURE 5, the door at the hinge line is firmly sealed. Movement by rotation of the latching lever **29**, however, will bring the pressure block **32** away from the pressure plate **33** on the door, and further rotation will move the latching lever **29** out of the path of the opening door.

In mounting the folding door, I accomplish a vernier adjustment which I have found necessary to an airtight seal. This I perform by utilizing the top bracket **17** and the pivot arm **18** in FIGURE 4. The top bracket is drilled with a set of holes on one-half inch spaced centers, whereas the pivot arm is drilled with a set of holes on 9/16 inch spaced centers. Thus for a given position several of the holes on the top bracket will match a corresponding number of holes on the pivot arm. With this form of vernier adjustment, I can raise or lower the appropriate side of the door to provide a perfect fit.

In setting up the cooler, the rubber seals are nailed into position on all four sides. They can either be nailed on the door itself, or they can be nailed on the top and side edges of the cooler against which the door will bear. I prefer then to place the additional rubber seal **13** on the bottom edge of the door. Also, of course, the hinge seal **15** is nailed on the edges of the door elements **4**, **4**.

Then the door is hung upon the bearings **5** and the top brackets **17** tightened in a rough adjustment. Then the track is mounted and the cable **23** is strung on the cable drum **24** and the cable thimble **26'** is mounted on the cable pin **27**.

I prefer to adjust the hanging of the door at this point by loosening the bolts **19** holding the top bracket **17** to the pivot arm **18**. Raising or lowering of a side of the door by this method enables me to obtain the proper compression of the bottom seal **13** along all points. Of course, to accomplish this I must choose a new set of matching holes for the bolts differng from the holes used in the unadjusted position.

The action of this door follows: In the retracted position the door elements **4**, **4** are shown in dotted lines as **4'**, **4'** in FIGURE 1. The hinge rubber seal elements **15'**, **15'** are also shown there in the open position.

As the door is lowered into position, the roller **10** rolls down the inside of the track **6**. When it reaches the bottom section **8** of the track, it reaches a portion of the track which is bent in from the vertical. The track bottom section **8**, however, is rigid and forces the roller to follow an inward path, which at the bottommost extremity forces the bottom of the door against the bottom of the sides of the cooler. The open channel of the

bottom rubber seal element is thus forced downward and in against the floor, thus effectively sealing the bottom of the door against the floor, while the rubber side seal **14** is effectively sealed also between the cooler wall and the door. At the same time the hinge rubber seals **15** are brought against each other to seal the hinge joint.

At this point the latching lever **29** is rotated in its joint so that the pressure block **32** is brought to bear on the pressure plate **33** of the door. This compresses the rubber side seal **14** in FIGURE 5, and forces the center of the door, that is, the ends of the hinge line, in against the side wall **34**. Thus the door is sealed on all sides.

Adjustment can be made in the angle of the sloping bottom section of track **8**, by loosening the bolts **9**, **9** and moving the track before tightening the bolts again, so that the bottom of the door will be properly closed by the action of the roller **10** against the track section **8**.

Having thus described my invention, it will be apparent that further modifications, variations, and changes will be possible to those skilled in the art, without departing from the spirit of the invention.

I claim:

In a counterbalanced vertically folding door for a cooler having two side walls, a floor, and a head, comprising an upper and a lower rectangular door element, said two door elements having confronting edge portions hinged together therealong, and suspended from a pair of bearings one of which is mounted on each side wall, a vertically disposed track adjacent each side of the door and attached to the side walls and projecting outwardly beyond the door, a pair of rollers secured to the bottom outside edges of the lower door element and disposed to travel in the track, a rubber seal member secured to the bottom edge of the lower door element cooperative with the floor, a rubber seal member secured to the inside edges of the door elements cooperative with the side walls, a rubber seal secured to the top inner edge of the upper door element cooperative with the head of the cooler, a rubber seal member secured to the upper edge of the lower door element and a cooperative rubber seal member secured to the lower edge of the upper door element to seal the door elements at the hinge line, a track bracket mounted upon the track at the closed hingeline position between the upper and lower door elements, a latching lever mounted upon said track bracket and forcibly engageable against the lower portion of said upper door element to provide sealed engagement of both door elements at said hingeline, a pair of top brackets, one on each side of said door, upon which the upper door element is mounted, a pair of pivot arms upon which said top brackets are suspended, one of said pivot arms being bolted to its cooperative top bracket by a vernier arrangement to provide vertical adjustability of one side of the door in hanging said door to secure a closed sealing arrangement along the sides and bottom of said door, said track having an adjustable section at the bottom thereof, sloping inward to force the door into airtight engagement at the floor.

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