



US 20060022563A1

(19) **United States**

(12) **Patent Application Publication**

**Huruoka**

(10) **Pub. No.: US 2006/0022563 A1**

(43) **Pub. Date:**

**Feb. 2, 2006**

(54) **DOOR LOCKING HANDLE ASSEMBLY WITH IN-CABINET UNLOCKING MACHANISM**

**Publication Classification**

(51) **Int. Cl.**  
*A47B 95/00* (2006.01)  
*A47B 96/00* (2006.01)  
(52) **U.S. Cl.** ..... **312/296**

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(57) **ABSTRACT**

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A walk-in freezing cabinet (13) is provided with a door locking handle assembly (10) and an in-cabinet unlocking mechanism. A worker can open a door (3) of the cabinet (13) from either the exterior or the interior of the cabinet (13) by either pulling upon and lifting an operating handle (14) of the assembly (10) or by depressing an in-cabinet push rod (1) of the mechanism. When moisture in the external air enters a receiving hole (9) of the door (3) frost is formed therein and contacts the push rod (1) which is slidably received in the receiving hole (9) of the door (3) to extend into the interior of the cabinet (13) resulting in locking of the in-cabinet push rod (1) with the frost. Such frost formation is prevented by a sealing member (7) disposed adjacent to the in-cabinet push rod (1) in the receiving hole (9).

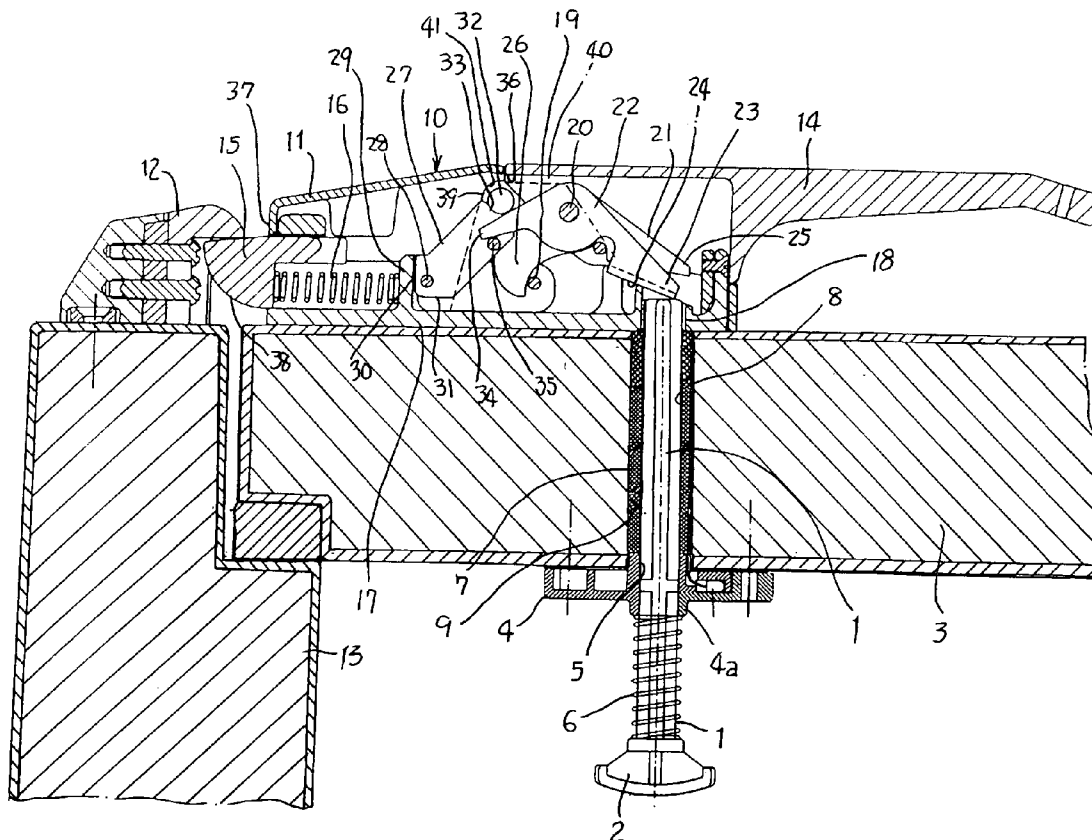
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(21) **Appl. No.: 10/982,571**

(22) **Filed: Nov. 5, 2004**

(30) **Foreign Application Priority Data**

Jul. 29, 2004 (JP) ..... 222568/2004



# FIG. 1

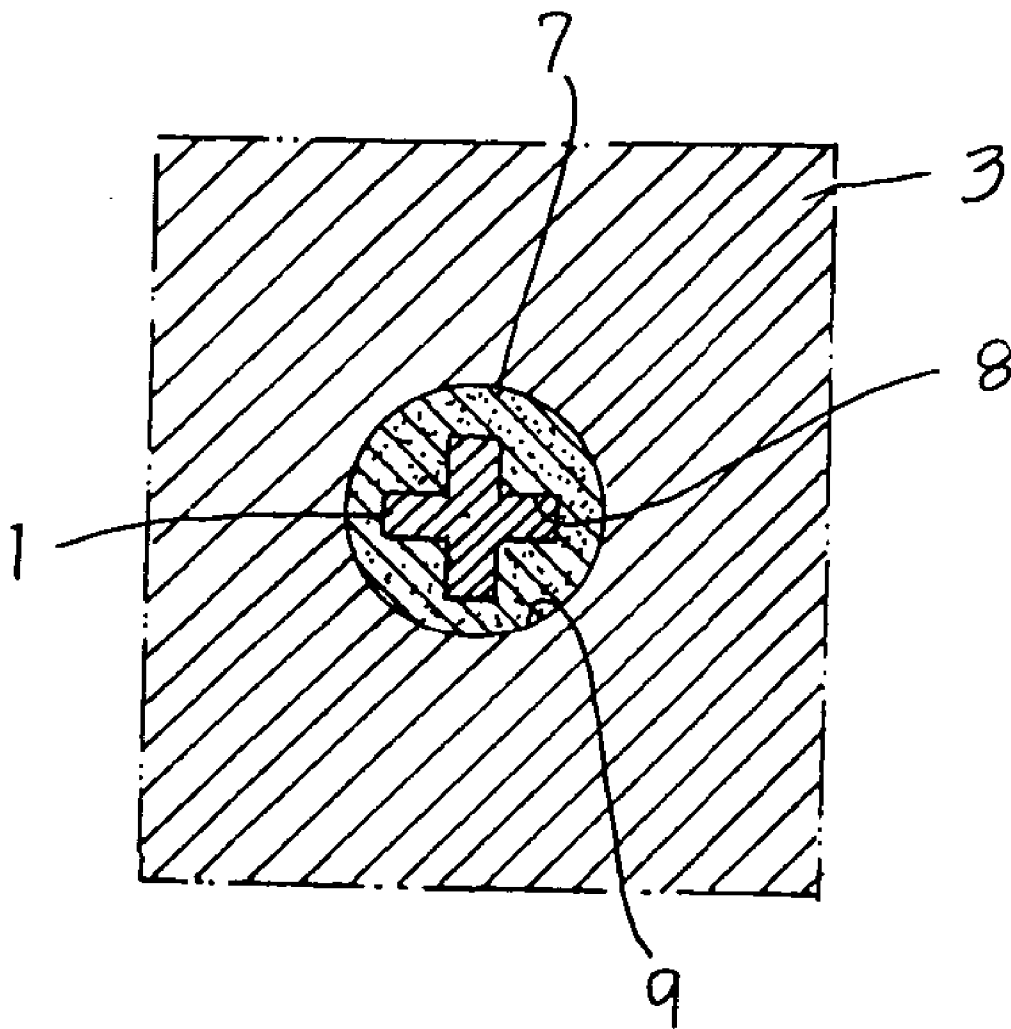
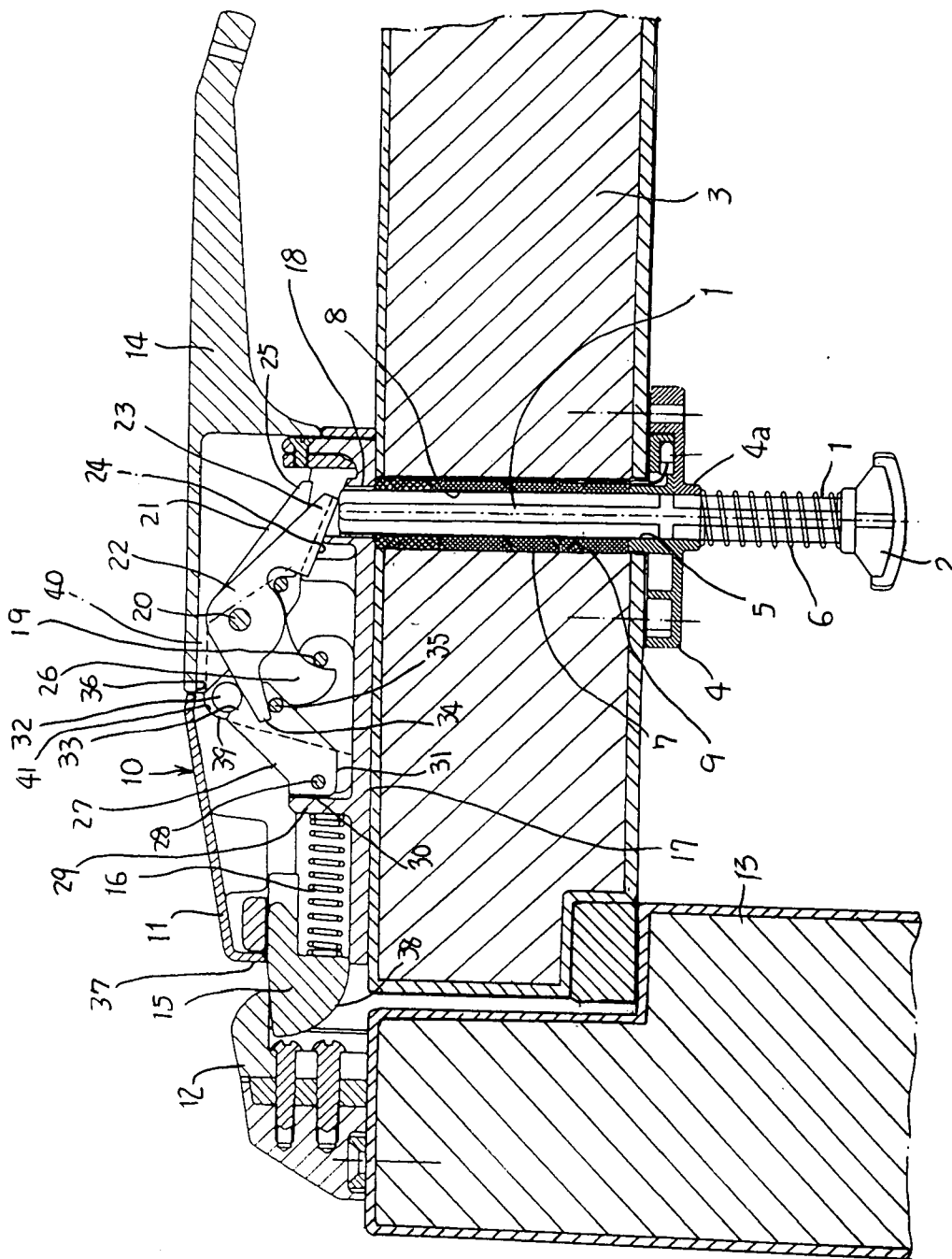
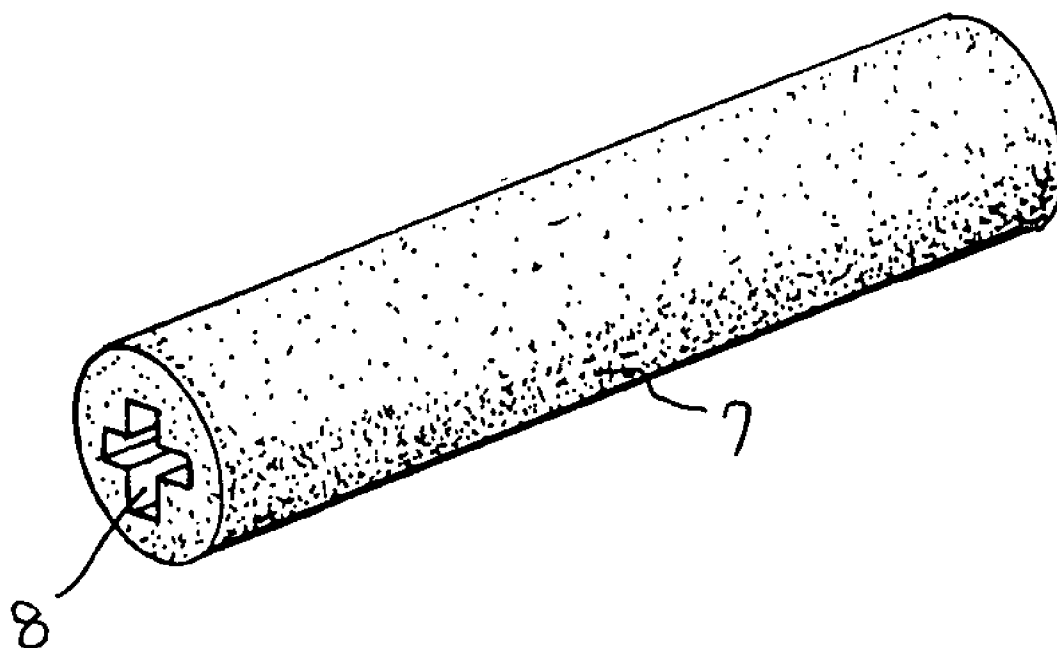


FIG. 2



# FIG. 3



## DOOR LOCKING HANDLE ASSEMBLY WITH IN-CABINET UNLOCKING MACHANISM

### BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a door locking handle assembly, which assembly is provided with an in-cabinet unlocking mechanism employed in a door of a large-sized walk-in type freezing cabinet and the like for business use.

[0003] 2. Description of the Related Art

[0004] This type of a conventional door locking handle assembly is disclosed in, for example such as Japanese Patent No. 2797276, in which: a stationary main body of the assembly is fixedly mounted on a front surface of a door of a freezing cabinet; pivotally mounted on the stationary main body of the assembly through a cross pivot pin is an operating handle which can be operated from the exterior of the cabinet; fixedly mounted on a jamb of the cabinet is a latch receiver which is detachably engaged with a latch member, wherein the latch member is provided in the stationary main body of the door locking handle assembly. In operation, when the operating handle is pulled away from the door of the cabinet so as to turn on its cross pivot pin, the latch member is driven or moved to its unlocking position, so that the door is unlocked from the cabinet.

[0005] In such a large-sized freezing cabinet for business use, articles contained in the cabinet (hereinafter referred to as "contained articles") are often rearranged in the cabinet and also carried in and out of the cabinet in a condition in which a refrigerating machine installed in the cabinet still continues its normal operation. Due to this, the conventional freezing cabinet is provided with an in-cabinet unlocking mechanism for escape of a worker having been accidentally confined to the cabinet, wherein the in-cabinet unlocking mechanism can be operated by such a worker from the inside of the cabinet in a manner such that the latch member is driven or moved to its unlocking position, as is disclosed in the above Japanese Patent No. 2797276 and further in Japanese Utility Model Application Laid-Open No. Sho 56-5987, for example.

[0006] This in-cabinet unlocking mechanism is constructed of: a stationary base member fixedly mounted on a rear surface of the door of the freezing cabinet; and, an in-cabinet push rod passing through both a guide hole of the stationary base member and a receiving hole of the door, wherein the receiving hole extends from a front surface of the door to a rear surface of the same door. More specifically, the in-cabinet unlocking mechanism is so designed as to permit the worker to escape out of the cabinet by himself or herself by depressing the in-cabinet push rod from the inside of the cabinet even when he or she is confined to the cabinet, wherein the in-cabinet push rod thus depressed by the worker drives the latch member to its unlocking position through an appropriate intermediate transmission mechanism, as is disclosed in the above Japanese Utility Model Application Laid-Open No. Sho 56-5987.

[0007] However, the freezing cabinet is disadvantageous in that: when a difference in temperature between the exterior and the interior of the cabinet, outside water vapor or moisture in the air can enter a clearance between an inner

peripheral surface of the receiving hole of the door and an outer peripheral surface of the push rod, and can freeze on contact with chilled air of the interior of the cabinet, so that the push rod can be locked by the frost thus formed around the push rod, which makes it impossible for the worker having been confined to the cabinet to move the in-cabinet push rod from the inside of the cabinet when he or she wants to escape out of the cabinet.

[0008] In order to prevent the in-cabinet push rod from being locked with the frost formed in the clearance between the receiving hole of the door and the push rod, there has been already proposed an in-cabinet heater in, for example, each of the Japanese Patent No. 2797276 and the Japanese Utility Model Application Laid-Open No. Sho 56-5987, where the in-cabinet heater is incorporated in the in-cabinet unlocking mechanism. However, this heater-incorporated type of in-cabinet unlocking mechanism may increase the entire manufacturing cost due to necessity of additional manufacturing cost for the heater's components. Further, such heater's components require their cumbersome electrical wiring works for power supply in installation. Furthermore, these electrical wirings of the heater's components and the heater's components themselves are particularly poor in impact resistance, and therefore require a frequent maintenance service, which increases the maintenance cost of the in-cabinet unlocking mechanism. These are disadvantages inherent in the conventional in-cabinet unlocking mechanism.

### SUMMARY OF THE INVENTION

[0009] Under such circumstances, the present invention was made. Consequently, it is an object of the present invention to provide a door locking handle assembly provided with an in-cabinet unlocking mechanism, which is free from any additional maintenance cost, capable of reducing the number of its components and the manufacturing cost thereof, and further capable of being installed in an easy manner.

[0010] The above object of the present invention is accomplished by providing:

[0011] In a door locking handle assembly provided with an in-cabinet unlocking mechanism, wherein: an operating handle is pivoted to a stationary main body through a cross pivot pin, the stationary main body being fixedly mounted on a front surface of a door of a freezing cabinet; a latch receiver is fixedly mounted on the cabinet and detachably engaged with a latch member which is provided in the stationary main body; when the operating handle is pulled away from the door to turn on the cross pivot pin, the latch member is moved to its unlocking position in which the door is unlocked from the cabinet; a stationary base member is fixedly mounted on a rear surface of the door and provided with a guide hole; the door is provided with a receiving hole which extends from the front surface to the rear surface of the door; an in-cabinet push rod passes through both the guide hole and the receiving hole to project inside the cabinet; when the in-cabinet push rod is pushed from inside of the cabinet, the latch member is moved to its unlocking position, the improvement wherein:

[0012] a sealing member, which is made of heat insulating material, is mounted in a clearance between an

inner peripheral surface of the receiving hole of the door and an outer peripheral surface of the in-cabinet push rod; and

[0013] the inner peripheral surface of the sealing member is brought into close contact with the outer peripheral surface of the in-cabinet push rod in a manner such that the in-cabinet push rod is capable of sliding along the sealing member.

[0014] Now, the effect of the present invention will be described.

[0015] In the present having the above construction, as described in the above: a clearance is provided between the inner peripheral surface of the receiving hole of the door and the outer peripheral surface of the in-cabinet push rod; and, the sealing member made of heat insulating material is mounted in such a clearance in a manner such that an inner peripheral surface of the sealing member is brought into close and slidable contact with the outer peripheral surface of the in-cabinet push rod. Due to this construction, in the present invention, there is no fear that the moisture in the external air enters the clearance between the inner peripheral surface of the receiving hole of the door and the outer peripheral surface of the in-cabinet push rod to contact with a chilled air of the interior of the cabinet. Consequently, it is possible for the present invention to prevent any frost formation around the push rod, which permits the worker having been accidentally confined to the cabinet to open the door of the cabinet from the inside of the cabinet without fail.

[0016] As described above, in the present invention, means for preventing the frost formation around the in-cabinet push rod is realized by means of the sealing member not by means of a heater element incorporated in the cabinet. Due to this, in the present invention, it is possible to eliminate any cumbersome wiring and installation works of heater components. Further, there is no fear of open circuit in the wirings of the heater components and the heater element itself, which may prevent any further increase in maintenance cost.

[0017] It is desirable to rigidly construct each components of the door locking handle assembly and the in-cabinet unlocking mechanism, particularly as to the in-cabinet stationary base member and the in-cabinet push rod by using metallic material in order to improve these components in resistance to mechanical shock.

[0018] The sealing member can be made of any rigid material, provided that the inner peripheral surface of the sealing member made of such rigid material is capable of fitting to the outer peripheral surface of the in-cabinet push rod. In general, the sealing member is made of a sponge-line foamed rubber or a sponge-line foamed plastics.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The above and other objects, advantages and features of the present invention will be more apparent from the following description taken in conjunction with the accompanying drawings in which:

[0020] FIG. 1 is a cross-sectional view of the in-cabinet push rod of the in-cabinet unlocking mechanism of the door

locking handle assembly according to an embodiment of the present invention, illustrating the door locked in its locking position;

[0021] FIG. 2 is a cross-sectional view of an essential part of the in-cabinet unlocking mechanism shown in FIG. 1; and

[0022] FIG. 3 is a perspective view of the sealing member which is incorporated in the in-cabinet unlocking mechanism shown in FIG. 2.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0023] The best modes for carrying out the present invention will be described in detail using an embodiment of the present invention with reference to the accompanying drawings.

[0024] In the embodiment of the present invention shown in the drawings, particularly in FIG. 2 illustrating a cross-sectional view of an essential part of an in-cabinet unlocking mechanism employed in a door locking handle assembly 10 of the present invention, an in-cabinet push rod 1 of the mechanism is constructed of a metallic bar member having a cross-like shape (i.e., “+”) in cross section. As is clear from FIG. 2, the in-cabinet push rod 1 has its inner end portion connected with a pad element 2 through which a worker can push or depress the in-cabinet push rod 1 from the inside of a freezing cabinet 13. Fixedly mounted on a rear surface of a door 3 of the freezing cabinet 13 is a stationary base member 4, which is provided with a guide hole 5 in its central portion. This guide hole 5 has a cross-like shape (i.e., “+”) in cross section. As shown in FIG. 2, a compression coil spring 6 serving as a return spring for returning the in-cabinet push rod 1 to its standby position is mounted in compressed mode between a guide sleeve portion 4a of the stationary base member 4 and the pad element 2 so as to be mounted on the in-cabinet push rod 1 in an insertion manner.

[0025] On the other hand, as is clear from FIG. 3, a sealing member 7 is constructed of an elongated sponge-like foamed plastic element and has a circular shape in cross section, formed in a central area of which cross section is a cross-shaped through-hole 8. This through-hole 8 has substantially the same shape and dimensions as those of the cross section of the in-cabinet push rod 1. The sealing member 7 is prepared by cutting an elongated sponge-like foamed plastic element into a plurality of segments using a cutter knife, each of which segments corresponds in longitudinal length to the sealing member 7 and therefore corresponds to the thickness of the door 3 in construction. The thus prepared sealing member 7 is then mounted in a receiving hole 9 of the door 3 in a forcible insertion manner so as to be press-fitted to the receiving hole 9. This receiving hole 9 is a kind of through-hole, which has a circular shape in cross section to extend from a front surface of the door 3 to a rear surface of the same door 3.

[0026] As is clear from the above description, the sealing member 7 has its outer peripheral surface press-fitted to an inner peripheral surface of the receiving hole 9 of the door 3 to enhance its sealing performance. More specifically, the sealing member 7 is closely packed in the receiving hole 9 over the entire length of the hole 9.

[0027] As for the construction of the door locking handle assembly 10, such construction is not limited to that of the

embodiment shown in the drawings and therefore may be appropriately modified as is well known in the art.

[0028] In the construction of the embodiment shown in the drawings, a stationary main body 11 of the door locking handle assembly 10 is fixedly mounted on a front surface of the door 3. On the other hand, a latch receiver 12 is fixedly mounted on a front surface of a jamb portion of the cabinet 13. An operating handle 14 is pivoted to the stationary main body 11 of the assembly 10 through a cross pivot pin 20. A latch member 15 is slidably mounted on the stationary main body 11 in a manner such that the latch member is capable of moving rightward and leftward in parallel to the front surface of the door 3, as viewed in FIG. 2. Further, the latch member 15 is constantly and resiliently urged leftward in its projecting direction in FIG. 2, under the influence of a resilient force exerted by a compression coil spring 16.

[0029] Also as shown in FIG. 2, the in-cabinet push rod 1 has its outer end portion inserted into a through-hole 18 of a plate-like base member 17 of the stationary main body 11.

[0030] Both a drive lever 21 and a release lever 22 are pivoted to the operating handle 14 through the cross pivot pin 20. As is clear from FIG. 2, the release lever 22 has its follower end portion 23 disposed in front of the through-hole 18 of the base member 17 of the assembly 10. The follower end portion 23 of the release lever 22 is provided with an interlocking wind projection 24, which is capable of abutting on an interlocking end portion 25 of the drive lever 21. A drive end portion 26 of the drive lever 21 is engaged with a follower portion 19 of the latch member 15.

[0031] A lock lever 27 has its proximal end portion pivoted to an intermediate portion of the latch member 15 through a pivot pin 28, and has a side surface of its proximal end portion formed into a flat surface portion 30 which is capable of abutting on a spring support portion 29 of the base member 17, which spring support portion 29 extends upward in FIG. 2. Further, the lock lever 27 is provided with a relief surface portion 31, which portion 31 is formed in a rear surface of the proximal end portion of the lock lever 27 so as to be free from any abutment against the spring support portion 29 of the base member 17 in operation. Formed in a front end portion of the lock lever 27 is a locking-bar receiving concave portion 33 which is capable of engaging with a locking bar 32 of an external lock (not shown). Provided in an intermediate portion of the lock lever 27 is a follower pin 35, which pin 35 extends outward in a direction perpendicular to the plane of the paper in FIG. 2 and is capable of abutting on a drive end portion 34 of the release lever 22 in operation.

[0032] In this door locking handle assembly 10 having the above construction, when a grip portion of the operating handle 14 is pulled away from the front surface of the door 3 in a manner such that the operating handle 14 is rotated counterclockwise on its cross pivot pin 20 as viewed in FIG. 2, the follower portion 19 of the latch member 15 is slidably withdrawn to the right-hand side of FIG. 2 by means of the drive end portion 26 of the drive lever 21. When the latch member 15 is sufficiently retracted to the right-hand side of FIG. 2 against a resilient force exerted by the compression coil spring 16, the front end portion of the latch member 15 is released from the latch receiver 12 so that the door 3 is unlocked from the cabinet 13, whereby the door 3 can be widely opened when the grip portion of the operating handle 14 is further pulled away from the cabinet 13.

[0033] Under such circumstances, when the worker has his or her hand detached from the operating handle 14, the latch member 15 returns to its initial position under the influence of a resilient force exerted by the compression coil spring 16 so that the front end portion of the latch member 15 projects outward from a left-side wall portion 37 of the stationary main body 11. In company with this rightward projection of the latch member 15, the operating handle 14 rotates clockwise on its cross pivot pin 20 to return to its initial position shown in FIG. 2. When the worker closes the door 3, the front end portion of the latch member 15 strikes the latch receiver 12 with its arcing rear surface 38. Due to this striking action, the front end portion of the latch member 15 is slightly retracted rightward in FIG. 2. At the same time, the locking-bar receiving concave portion 33 formed in the front end portion of the lock lever 27 moves integrally with the latch member 15 in a manner such that the concave portion 33 of the lock lever 27 partially crosses the through-hole 39 formed in the side wall portion of the stationary main body 11.

[0034] In operation, once the front end portion of the latch member 15 passes the front surface of the latch receiver 12, the latch member 15 is quickly and slidably moved back to the left-hand side of FIG. 2 under the influence of the resilient force exerted by the compression coil spring 16 to deeply engage with a rear surface of the latch receiver 12, so that the door 3 is locked again to the cabinet 13. In case that the door 3 is completely locked to the cabinet 13 after completion of daily service, the external lock such as a padlock or the like has its locking bar 32 inserted into both the through-hole 39 of the stationary main body 11 and a through-hole 41 of an upright wall portion 40 of the base member 17 of the stationary main body 11. In a condition in which the locking bar 32 of the external lock is thus inserted in the above-mentioned manner, it is impossible for the worker to rotate the operating handle 14 in order to open the door 3 of the cabinet 13, because the operating end portion 36 of the operating handle 14 abuts on an outer peripheral surface of the locking bar 32 of the external lock.

[0035] Even when the door 3 of the freezing cabinet 13 is accidentally closed in a condition in which the worker still works inside the cabinet 13, the worker thus confined to the cabinet 13 can open the door 3 from the inside of the cabinet by simply pushing the in-cabinet push rod 1 which passes through both the receiving hole 9 of the door 3 and the through-hole 18 of the base member 17 to extend inside the cabinet 13. More particularly, in such an opening operation of the door 3, when the in-cabinet push rod 1 is pushed by the worker confined to the cabinet 13, the follower end portion 23 of the release lever 22 is pushed upward in FIG. 2 by the in-cabinet push rod 1 to rotate the release lever 22 counterclockwise on the pivot pin 20, as viewed in FIG. 2. As a result, the drive end portion 34 of the release lever 22 pushes the follower pin 35 of the lock lever 27 downward to rotate the lock lever 27 clockwise on its pivot pin 28, so that the lock lever 27 is released from the locking bar 32 of the external lock, whereby the latch member 15 is also released.

[0036] When the in-cabinet push rod 1 is further pushed or depressed deeply by the worker in the cabinet 13, the follower end portion 23 of the release lever 22 has its wing projection 24 brought into press contact with the follower end portion 25 of the drive lever 21 to push the follower end portion 25 of the drive lever 21 upward in FIG. 2. Due to

this pushing-up operation performed by the wing projection 24 of the release lever 22 with respect to the follower end portion 25 of the drive lever 21, the drive lever 21 forces its drive end portion 26 to withdraw the follower portion 19 of the latch member 15 to the right-hand side of FIG. 2, so that the latch member 15 is slidably retracted rightward to its unlocking position.

[0037] Due to this, it is possible for the worker having been confined to the cabinet 13 to easily and immediately escape from the cabinet 13 without fail by simply depressing the in-cabinet push rod 1 deeply even in a condition in which the locking bar 32 of the external lock (not shown) has been inserted in both the through-holes 39, 41 in the door locking handle assembly 10 of the present invention.

[0038] While the present invention has been particularly shown and described with reference to the preferred embodiment and a modification thereof, it will be understood by those skilled in the art that various modifications and changes may be made therein without departing from the spirit of the present invention as defined by the appended claims.

[0039] Finally, the present application claims the Convention Priority based on Japanese Patent Application No. 2004-222568 filed on Jul. 29, 2004, which is herein incorporated by reference.

1. In an improved door locking handle assembly provided with an in-cabinet unlocking mechanism, wherein: a stationary main body (11) being fixedly mounted on a front surface of a door (3) of a freezing cabinet (13); an operating handle (14) is pivoted to said stationary main body (11) through a cress pivot pin (20), a latch receiver (12) is fixedly mounted on said cabinet (13) and detachably engaged with a latch member (15) which is provided in said stationary main body (11); when said operating handle (14) is pulled away from said door (3) to turn on said cross pivot pin (20), said latch member (15) is movable to its unlocked position in which said door (3) is unlocked from said cabinet (13); a stationary base member (17) is fixedly mounted on a rear

surface of said door (3) and provided with a guide hole (5); said door (3) is provided with a receiving hole (9) which extend from said front surface to said rear surface of said door (3); an in-cabinet push rod (1) adapted to pass through both said guide hole (5) and said receiving hole (9) to project within said cabinet (13); when said in-cabinet push rod (1) is pushed from the inside of said cabinet (13), said latch member (15) moves to its unlocking position, the improvement wherein:

a sealing member (7) made of heat insulating material is mounted in a clearance between an inner peripheral surface of said receiving hole (9) of said door (3) and an outer peripheral surface of said in-cabinet push rod (1); and

said sealing member (7) inner peripheral surface is brought into close contact with said outer peripheral surface of said in-cabinet push rod (1) in a manner such that said in-cabinet push rod (1) is capable of sliding along said sealing member (7).

2. In a door locking handle assembly as claimed in claim 1, wherein sealing member (7) is formed of a resilient material selected from the group comprising a sponge-like foamed rubber or sponge-like foamed plastic.

3. In a door locking handle assembly as claimed in claim 1, wherein said sealing member (7) being defined by said elongated sponge-like foam plastic structure having a plurality of spaced segments thereby defining a unitary structure, said sealing member (7) corresponding in thickness to that of said door (3) and forced fitted within said receiving hole (9) of said door (3).

4. In a door locking handle assembly as claimed in claim 1, wherein said push rod (1) being elongated and having a “+” cross-section adapted to be disposed within said sealing member (7) formed with a central opening to receive said push rod (1), said push rod (1) and said sealing member (7) being forced fitted within said receiving hole (9) of said door (3).

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