Title: A TOILET LATCH

Abstract: A latching assembly for locking the door of public toilets is disclosed. The latching assembly includes a sensor to detect the presence of an occupant inside the public toilet and to generate a trigger in the event that the toilet is occupied by an occupant. Further, the assembly includes a latch responsive to the trigger and configured to lock the door of the public toilet from inside by changing the configuration from an unlocked configuration to a locked configuration in response to the trigger. The latch remains in the locked configuration inoperable from outside till the toilet is occupied. A display means responsive to the trigger displays the occupancy status of the toilet, in the event that the trigger is generated by the sensor and an unlocking module configured to facilitate unlocking of the locked door, from inside the public toilet.
A TOILET LATCH

FIELD OF DISCLOSURE

The present disclosure relates to the field of toilet latches.

BACKGROUND

Latches are primarily used for the purpose of locking doors. Normal latches are locked manually from inside for the purpose of securing the door. Restricted toilet facilities like aircraft toilets, train toilets typically have normal latches installed on them. The problem arises when a person enters a toilet having a normal latch and forgets to latch the door from inside. In such an event, other people waiting to use the toilet would barge into the toilet; only to find that the toilet is already occupied, thereby leading to the creation of an embarrassing situation for the person inside the toilet.

A conventional toilet latch needs to be manually operated by the person inside the toilet in order to secure the door. The conventional latch does not operate independent of the person locking the door or leaving the door unlocked. Moreover, the conventional latch does not operate in addition to the person inside the toilet actually locking the door.

Conventional latches are automatically moved from a partially retracted position to a fully extended locking position when the door on which the latch is mounted, is closed. However, such conventional latching mechanisms do not detect the presence of a person inside the toilet and require the door to be force shut by the person inside the toilet. Such conventional latching mechanisms would not work towards locking the door, if the door is not manually closed by the person inside the toilet. Conventional lock mechanisms also concentrate on automatically closing the door which is in an incompletely (half) closed position. But for such mechanism to work, the person inside the toilet needs to at least push the door into a half closed position.

Conventional latch mechanisms also include systems that make use of a pulse signal to determine the speed of travel of the door, the direction of travel of the door and accordingly lock the door in the event that the door is close to its closing area.
However, even such a mechanism warrants that the door is pushed from its open position towards a closed position. None of the conventional latching mechanisms propose locking the door of a toilet by means of recognizing the presence of a person inside the toilet. The prior art system warrants that the door is pushed from an open position to at least a semi-opened position for the automatic latching mechanism to work.

Moreover, the conventional lock mechanisms do not have a latch override mechanism. That is, the door that has been automatically locked cannot be opened from the outside, in the event of an emergency. For example, in the event that a child/elderly person goes into the toilet and the toilet door gets locked automatically. In case of conventional latching mechanisms, there is no facility of opening the locked door from outside in the event that the child/elderly person is unable to open the door manually from the inside. In case of conventional latching mechanisms the onus is on the child/elderly person inside to open the door manually from inside. Therefore, there is felt a need for a latching mechanism that includes a lock overriding mechanism by which the door locked from inside can be selectively opened from outside in case of an emergency. There is also felt a need for an intelligent lock assembly which can detect the presence of a person inside a toilet and accordingly lock the door of the toilet without any intervention from the person inside the toilet.

OBJECTS

Some of the objects of the present disclosure are described herein below:

It is an object of the present disclosure to ameliorate one or more problems of the prior art or to at least provide a useful alternative.

An object of the present disclosure is to provide a toilet latch assembly that is uncomplicated, easy and simple to use.

Yet another object of the present disclosure is to provide a toilet latch assembly which latches the toilet door independent of the user actually latching the toilet door.
Still a further object of the present disclosure is to provide a toilet latch assembly that automatically detects the presence of a person inside the toilet and latches the door of the toilet.

Another object of the present disclosure is to provide a toilet latch assembly that can be locked using a magnetic field.

Still a further object of the present disclosure is to provide a toilet latch assembly that can be unlocked either manually or by de-energizing the magnetic field.

Yet another object of the present disclosure is to provide a toilet latch assembly that monitors the volume of space available inside the toilet.

Other objects and advantages of the present invention will be more apparent from the following description when read in conjunction with the accompanying figures, which are not intended to limit the scope of the present invention.

SUMMARY

The present disclosure envisages a latching assembly for locking the door of public toilets, the latching assembly comprising:

- a sensor configured to detect the presence of an occupant inside the public toilet, the sensor further configured to generate a trigger in the event that the toilet is occupied by an occupant;
- a latch responsive to the trigger, the latch configured to lock the door of the public toilet from inside by changing the configuration from an unlocked configuration to a locked configuration in response to the trigger, the latch configured to remain in the latched configuration inoperable from outside till the toilet is occupied;
- a display means responsive to the trigger, the display means configured to display the occupancy status of the toilet, in the event that the trigger is generated by the sensor; and
- an unlocking module configured to facilitate unlocking of the locked door, from inside the public toilet.
In accordance with the present disclosure, the lock assembly further includes a relay module configured to be activated by the trigger, the relay module further configured to generate a magnetic field.

In accordance with the present disclosure, the latching assembly further includes a magnetic circuit operatively coupled to the relay and the latch, the magnetic circuit configured to be energized by the magnetic field generated by the relay, the magnetic circuit further configured to attract the latch thereby changing the position of the latch from the unlocked configuration to the locked configuration.

In accordance with the present disclosure, the latching assembly further includes a master switch remotely located with respect to the toilet, the master switch configured to de-energize the magnetic circuit by impeding the magnetic field produced by the relay, thereby repelling the latch and changing the position of the latch from the locked configuration to the unlocked configuration.

In accordance with the present disclosure, the latch is selected from the group consisting of spring loaded latch, magnetic latch and metal latch.

In accordance with the present disclosure, the latch can be manually operated to change the position of the latch from the locked configuration to the unlocked configuration.

In accordance with the present disclosure, the unlocking means includes a switching means located inside the toilet and configured to de-energize the magnetic circuit by impeding the magnetic field produced by the relay, thereby repelling the latch and changing the position of the latch from the locked configuration to the unlocked configuration.

In accordance with the present disclosure, the sensor is configured to monitor the volume available inside the toilet, the sensor further configured to detect the presence of an occupant in the event that there is a decrease in the volume available inside the toilet.
In accordance with the present disclosure, the display means is further configured to display the occupancy status of the toilet as 'unoccupied', until the trigger is generated by the sensor.

**BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS**

The toilet latch assembly will now be described with reference to the accompanying, non-limiting drawings, in which:

**FIGURE 1** illustrates a schematic of a toilet latch assembly.

**DETAILED DESCRIPTION OF THE ACCOMPANYING DRAWINGS**

The present disclosure envisages a latching assembly for locking the door of public toilets. The latching assembly envisaged by the present disclosure detects the presence of an occupant inside the toilet and automatically changes the occupancy status of toilet and automatically latches the door of the toilet, independent of/in addition to the occupant actually latching the door of the toilet.\(^{\text{A}}\)

Referring to the accompanying **FIGURE 1**, there is shown a schematic diagram representing the working of the toilet latch assembly of the present disclosure. The toilet latch assembly 100 includes a sensor 10 configured to detect the presence of an occupant inside the public toilet. The sensor 10 is selected from the group of sensors consisting of IR sensor, volumetric sensor, electromagnetic sensor and sonar sensor.

In accordance with one embodiment of the present disclosure, the sensor 10 is an IR sensor. In accordance with this embodiment of the present disclosure, infrared sensors are preferably located on the door of the toilet and emit infrared radiations either in a vertical direction or in a horizontal direction. Preferably, a couple of infrared sensors are located on the door of the toilet. These infrared sensors emit IR beams which are extended either along the length of the toilet door or breadth of the toilet door or both. For the sake of explanation two infrared sensors are taken into consideration. The first infrared sensor is located close to the toilet door and the second infrared sensor is located at a certain distance from the toilet door such that an occupant entering the toilet has to pass through the first infrared beam at first and then through the second
infrared beam. When an occupant enters the toilet, he/she crosses through the first beam first, since the first sensor is located closer to the toilet door in comparison to the second infrared sensor. When the occupant crosses the first IR beam thereby disrupting the flow of the first beam, a first up down counter's (not shown in figures) value is changed from down (0) to up (1). When the occupant crosses the second IR beam thereby disrupting the flow of the second beam, a second up-down counter's (not shown in figures) value is changed from down (0) to up (1). The changing of the value of the first up-down counter followed by the changing of the value of the second up down counter denotes that the toilet has been occupied by an occupant.

In accordance with another embodiment of the present disclosure, the sensor 10 is a volumetric sensor. The volumetric sensor monitors the volume of free space available inside the public toilet. When an occupant walks inside the toilet there would be a steep change in the volume of free space available inside the toilet. Therefore, the volumetric sensor detects that the toilet has been occupied by an occupant.

In accordance with another embodiment of the present disclosure, the sensor 10 is an electro-magnetic sensor. The electro-magnetic sensor fills the space of the public toilet with electro-magnetic field. Whenever an occupant enters the toilet, the contour (spread) of the electro-magnetic field gets disturbed thereby leading to the determination that the toilet has been occupied by an occupant.

In accordance with another embodiment of the present disclosure, the sensor 10 is a sonar sensor. The sonar sensor emits sonar waves in certain directions inside the public toilet. The distance travelled by the sonar waves from the sensor to a reference object always remains constant. When the toilet is occupied by an occupant, the occupant acts as an obstacle between the sensor and the reference object thereby causing a decrease in the distance travelled by the sonar waves. If there is a decrease in the distance travelled by the sonar waves and the distance travelled by the sonar waves is not the distance that was normally travelled by the sonar waves, an intelligent system (not shown in diagrams) cooperating with the sonar sensor determines that the toilet is occupied by an occupant.
In accordance with the present disclosure, the sensor 10 generates a trigger in the event that the toilet is occupied by an occupant. The sensor 10, in response to the toilet being occupied, generates a trigger which is received by a relay module 12. The trigger generated by the sensor 10 can be a pulse signal. The relay module 12 is operatively coupled to a magnetic circuit 14. The relay module 12, in response to the trigger generated by the relay module generates a magnetic field which in turn energizes the magnetic circuit 14. The relay module 12, in accordance with the present disclosure includes a coil (not shown in the figures). One end of the coil is grounded and the other end of the coil is connected to a power supply of either '5 volts', '12 volts' or '24 volts'. In response to the sensor 10 detecting the presence of an occupant inside the toilet, current is made to pass through the coil present in the relay module 12. The coil in response to the flow of current stores the energy generated by the flow of current and subsequently generates a magnetic field.

The relay module 12, in accordance with the present disclosure is magnetically coupled to a magnetic circuit 14. The magnetic circuit 14, in accordance with the present disclosure is configured to get energized by the magnetic field generated by the relay module 12.

In accordance with the present disclosure, the magnetic circuit 14 is magnetically coupled to a latch denoted by the reference numeral 16. The latch 16 includes a latch bar (not shown in figures) which is configured to secure the door. A corresponding latch bar holder (not shown in figures) is attached to the frame of the door. The door is locked when the latch bar is inserted into the latch bar holder. The door is secured when the latch bar moves form a retracted position to a fully extended position thereby getting itself inserted completely into the latch bar holder.

In accordance with the present disclosure, the magnetic circuit is configured to be energized by the magnetic field produced by the relay module 12. In accordance with one embodiment of the present disclosure the latch bar is a spring loaded latch bar. In accordance with another embodiment of the present disclosure the latch bar is magnetic latch bar. In accordance with yet another embodiment of the present disclosure the latch bar is metal latch bar.
In accordance with the present disclosure, if the latch bar is made up of a magnetic material selected from the group consisting of paramagnetic material and Ferro magnetic material, the magnetic circuit 14 is placed on the frame of the door and in proximity to the latch bar holder in such a way that the energized magnetic circuit 14 attracts the latch bar towards the latch bar holder and subsequently the latch bar gets attracted thereby changing its position from a retracted position (unlocked configuration) to an extended position (locked configuration) and thereby getting inserted into the latch holding bar, thereby securing the door of the toilet. In accordance with the present disclosure, the door of the public toilet, once locked automatically from inside, cannot be opened from the outside.

In accordance with the present disclosure, if the latch bar is made up of a dia-magnetic material, the magnetic circuit 14 is placed on the frame of the door and in proximity to the latch bar and on the door of the toilet and away from the latch bar holder in such a way that the energized magnetic circuit 14 repels the latch bar towards the latch bar holder and subsequently the latch bar gets repelled thereby changing its position from a retracted position (unlocked configuration) to a fully extended position (locked configuration) and thereby getting inserted into the latch holding bar, thereby securing the door of the toilet.

In accordance with the present disclosure, the toilet latch assembly 100 further includes a display module 18 responsive to the trigger generated by the sensor 10. When the sensor 10 generates a trigger indicating that the toilet is occupied by an occupant, the display module 18 changes the occupancy status of the toilet and displays the fact that the toilet has been occupied. Until the trigger is generated by the sensor 10, the display module 18 displays the status of the toilet as unoccupied. In accordance with the present disclosure, the latching assembly 100 further includes an unlocking module (not shown in figures) which facilitates unlocking of the locked door of the public toilet from inside. The unlocking module enables the latch bar to be pushed back from the latch bar holder thereby changing the position of the latch bar from the extended position (locked configuration) to the retracted position (unlocked configuration), thereby providing for the door to be opened from inside.
In accordance with another embodiment of the present disclosure, the unlocking module includes a switching module (not shown in figures). The switching module includes a switch which when pressed is configured to de-energize the magnetic circuit 14 by impeding the flow of current through the relay module 12. Subsequent to impediment of the flow of current through the relay module 12, the magnetic circuit gets de-energized and subsequently repels the latch bar (if the latch bar is made up of Para/Ferro magnetic material) or attracts the latch bar (if the latch bar is made up of Dia magnetic material), thereby changing the position of the latch bar from the extended position (locked configuration) to the retracted position (unlocked position) and enabling the door of the public toilet to be opened.

In accordance with the present disclosure, the toilet latch assembly 100 further includes a master switch remotely located from the public toilet. The master switch whenever pressed is configured to de-energize the magnetic circuit 14 by impeding the flow of current through the relay module 12. Subsequent to impediment of the flow of current through the relay module 12, the magnetic circuit gets de-energized and subsequently repels the latch bar (if the latch bar is made up of Para/Ferro magnetic material) or attracts the latch bar (if the latch bar is made up of Dia magnetic material), thereby changing the position of the latch bar from the extended position (locked configuration) to the retracted position (unlocked position) and enabling the door of the public toilet to be opened.

TECHNICAL ADVANTAGES

The technical advantages envisaged by the system of the present disclosure include the following:

- providing a toilet latch assembly that is uncomplicated, easy and simple to use;
- providing a toilet latch assembly which latches the toilet door independent of the user actually latching the toilet door;
- providing a toilet latch assembly that automatically detects the presence of a person inside the toilet and latches the door of the toilet;
- providing a toilet latch assembly that can be locked using a magnetic field;
• providing a toilet latch assembly that can be unlocked either manually or by de-energizing the magnetic field; and

• providing a toilet latch assembly that monitors the volume of space available inside the toilet.
Claims:

1. A latching assembly for locking the door of public toilets, said latching assembly comprising:
   - a sensor configured to detect the presence of an occupant inside said public toilet, said sensor further configured to generate a trigger in the event that the toilet is occupied by an occupant;
   - a latch responsive to said trigger, said latch configured to lock the door of the public toilet from inside by changing the configuration from an unlocked configuration to a locked configuration in response to said trigger, said latch configured to remain in said locked configuration inoperable from outside till said toilet is occupied;
   - a display means responsive to said trigger, said display means configured to display the occupancy status of the toilet, in the event that said trigger is generated by said sensor; and
   - an unlocking module configured to facilitate unlocking of the locked door, from inside said public toilet.

2. A latching assembly as claimed in claim 1, wherein said lock assembly further includes a relay module configured to be activated by said trigger, said relay module further configured to generate a magnetic field.

3. A latching assembly as claimed in claim 1, wherein said latching assembly further includes a magnetic circuit operatively coupled to said relay and said latch, said magnetic circuit configured to be energized by the magnetic field generated by said relay, said magnetic circuit further configured to attract the latch thereby changing the position of the latch from the unlocked configuration to the locked configuration.

4. The latching assembly as claimed in claim 1, wherein said latching assembly further includes a master switch remotely located with respect to said toilet, said master switch configured to de-energize said magnetic circuit by impeding the magnetic field produced by said relay, thereby repelling the latch and
changing the position of the latch from the locked configuration to the unlocked configuration.

5. The latching assembly as claimed in claim 1, wherein said latch is selected from the group consisting of spring loaded latch, magnetic latch and metal latch.

6. The latching assembly as claimed in claim 1, wherein said latch can be manually operated to change the position of the latch from the locked configuration to the unlocked configuration.

7. The lock assembly as claimed in claim 1, wherein said unlocking means includes a switching means located inside said toilet and configured to de-energize the magnetic circuit by impeding the magnetic field produced by said relay, thereby repelling the latch and changing the position of the latch from the locked configuration to the unlocked configuration.

8. The latching mechanism as claimed in claim 1, wherein said sensor is configured to monitor the volume available inside the toilet, said sensor further configured to detect the presence of an occupant in the event that there is a decrease in the volume available inside said toilet.

9. The latching mechanism as claimed in claim 1, wherein said display means is further configured to display the occupancy status of the toilet as 'unoccupied', until said trigger is generated by said sensor.