

SLIDING DOOR SYSTEM AND THE METHOD OF OPERATING THE SAME

FIELD OF THE INVENTION

The invention generally relates to doors. Specifically, the present invention relates to sliding doors having a door frame with sliding abutment and recess as travelling rail and
5 pivoting mechanism that provides the doors to swing to open and close cooperatively.

BACKGROUND OF THE INVENTION

Conventional door has a door frame holding the door with at least two hinges thereto. The door pivots about the hinges to allow the door to swing between the open and a closed position. These conventional doors have significant disadvantages such as
10 sufficient large area is needed at the front of the door for the door to swing outward. Thus, this will take up spacing of the room and reduce the available space of the room.

Conventional sliding doors slide on track provided beneath the base of the doors or the top of the door. A typical sliding door is comprised of a rectangular door and is generally slide on a track at the top or the base of the doors. The sliding door is used where there
15 is insufficient space for the door to swing. However the mounting of the track for the sliding doors is within an interior wall or the floor of the room and the doors are relatively expensive. If the doors or the tracks are damaged, it may be difficult to repair.

Both conventional hinged doors and conventional sliding doors are manufactured to specific sizes to accommodate standard-sized door openings, and therefore, the size
20 and shape of the doors are limited by the size and shape of the door openings. Manufactures must stock additional inventory to accommodate the various sizes, further increasing costs. Conventional sliding doors do not provide a sufficient width door entrance as half of the size of the door frame has been occupied by another panel of the door.

25 US Patent No. 8,561,352 relates to a sliding door with a door leaf suspended from at least one carriage displaceably guided along a roller rail profile disposed at one of a wall and a ceiling, the sliding door includes a closing device configured to displace the door leaf into a closed position in a decelerated manner, the closing device disposed at the door leaf comprises: a first spring-damper element including a first spring and a first
30 damper; and a second spring-damper element including a second spring and a second damper, the second spring-damper element being disposed to be counter-directional to the first spring-damper element, wherein the first spring and first damper of the first

spring-damper element cooperate to displace the door leaf into the closed position in a decelerated manner, and the second spring and second damper of the second spring-damper element cooperate to displace the door leaf into an open position in a decelerated manner.

- 5 US Patent No. 8381443 discloses a sliding door with a sliding panel and a fixed panel allows for the sliding panel to pivot with respect to the fixed panel regardless of the position of the sliding panel and allows both the sliding panel and fixed panel to pivot with respect to an outer frame in which the panels are mounted when the sliding panel is fully open or nearly fully open without requiring a floor track. The sliding panel may move
- 10 linearly with respect to the fixed panel and outer frame along the length of a header, and a guide bracket cooperatively engaged with the sliding panel may be partially positioned in a guide track formed in the fixed panel bottom rail. A floor plate may be secured to the floor surface adjacent the bottom end of a first jamb to provide support/stability to the panels.
- 15 US Patent No. 7,743,557 discloses a sliding track for sliding doors includes a sliding door track and a glass fixed panel track which have an inverted U-shape cross section with an opening facing downward. The sliding door track has a left and a right inner wall that have a pair of guiding tracks formed thereon to allow a plurality pairs of rollers which are hinged on a hanging track which is fastened to a sliding door on a lower side to roll
- 20 thereon in a straddle manner. The sliding door track further has a pair of first wedge troughs on the upper left and upper right corners, and a pair of second wedge troughs on a lower side. The first and second wedge troughs are coupled with the glass fixed panel track. The sliding door track and the glass fixed panel track may also be coupled with an ornamental plate on the top. The glass fixed panel track may further be coupled with a
- 25 sealing plate on the bottom.

Accordingly, there is a need to innovate a door system that is not limited to standard-sized door openings, and provides a wider entrance and that incorporates a pivoting mechanism that allows the door to be swung in order to provide a maximum entrance.

- The present invention discloses a wall-mounted sliding door that can be used with a
- 30 range of door opening sizes. The door maximizes the space available within a room or a hall. The door does not require a lengthy floor or ceiling-mounted track that may become damaged or obstructed. The door pivoting mechanism also allows the door to be fully opened easily so as to provide a maximum entrance space.

SUMMARY OF THE INVENTION

The present invention relates to a sliding door system, comprising: a door frame having a top inner edge; a first door panel and a second door panel which are slidable with each other, characterized in that both the first door panel and the second door panel are provided with a top horizontal bar and a bottom horizontal bar, wherein the base of the bottom horizontal bar of the two panels is provided with elongated slot and one end of each of the base of the two door panels is extended to form an abutment which is slidable within the slots of each of the bottom bar; and the top horizontal bar has a male abutment and a female recess where the male abutment formed on one of the panel is slidable within the recess of the top horizontal bar of the other door panel, whereby the first door panel and the second door panel are capable of slidably positioned at juxtaposed position; a pair of pivot device to pivotally mounted one panel of the door to the edge of the one of the two door panels, such that the doors at juxtaposed position is capable of swinging open about the pivot point on the door frame, thereby a widest door opening is obtained via sliding of one door panel and the swinging opening of the juxtaposed doors.

An object of the present invention is to provide a sliding door system, wherein the door frame is wall-mounted to support the first and second door panel for which the door is pivotally mounted at one edge of the door frame.

A further object of the present invention is to provide a sliding door system, wherein the door size of the first door panel and the second door panel is identical or of different size.

It is another object of the present invention to provide a sliding door system, wherein the female recess on the top horizontal bar of one door panel is provided with a stopper to stop the sliding movement when the edge of one door panel touches the edge of the other panel in the course of a full sliding of the sliding door.

Still another object of the present invention is to provide a sliding door system, wherein the door swings to a maximum of 180 degree.

Another main object of the present invention is to provide a method of operating a sliding door system comprising the steps of

- i. sliding one of the two door panels to the other door panel such that the door panels are at juxtaposed position;
- ii. integrating the first door panel with the second door panel to form one unit; and

iii. swinging open the door which is at juxtaposed position until an opening of a desired width is obtained.

Yet still a further object of the present invention is to provide a method of operating a sliding door system, wherein the first panel and second panel are slidable by way of
5 rollers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a perspective view showing a closed door in accordance with the present invention.

FIG. 1B is a front view showing the opening of the door in accordance with the present
10 invention.

FIG. 1C is a schematic view showing the opening of the door by sliding one of the door panel to be at juxtaposed position with the other door panel in accordance with the present invention.

FIGS. 1D -1G schematically shows the sequences of operating the sliding door system
15 in accordance with the present invention.

FIG. 2 is a perspective view showing the first panel and the second door panel being at a closed position in accordance with the present invention.

FIG. 3 is a perspective view showing the door being swing opened while one of the door panel being slide to the other door panel in accordance with the present invention.

FIG. 4 is a perspective view showing the abutment sliding within the elongated slot in
20 accordance with the present invention.

FIG. 5 is a perspective view showing the sliding movement of the male abutment within the female recess in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

25 As best shown in FIGS. 1-3, the present invention is a two-panel wall-mounted sliding door system. FIG. 1 shows the door 100 in a closed position on a door frame 810 mounted onto a wall in accordance with the present invention. The door frame 810 is generally a rectangular shape and with two door panels, a first door panel 120 and a second door panel 130, are slidably mounted thereon. FIG. 3 shows the doors in the

opened position permitting entering or existing the room or house mounted with the door 100. FIG. 2 is a perspective view of a door wherein the first door panel 120 and second door panel 130 are at juxtaposed position. In the preferred embodiment of the present invention, the door size of the first door panel 120 and the second door panel 130 is either identical or of different size. Different size of door panels 120, 130 is applicable to conform to the size of the frame.

Referring to FIGs. 2-5, in accordance with a preferred embodiment of the present invention, the sliding door 100 system, comprises: a. a door frame 810 substantially rectangular shape with a top inner edge 820; b. a first door panel 120 and a second door panel 130 which are slidable with each other, characterized in that both the first door panel 120 and the second door panel 130 are provided with a top horizontal bar 140 and a bottom horizontal bar 150, wherein the base of the bottom horizontal bar 150 of the two panels 120, 130 is provided with an elongated slot 200 and one end of each of the base of the two door panels 120, 130 is extended to form an abutment 210 which is slidable within the elongated slots 200 of each of the bottom bar 150; and the top horizontal bar 140 has a male abutment 510 and a female recess 500 where the male abutment 510 formed on one of the panels 120, 130 is slidable within the female recess 500 of the top horizontal bar 140 of the other door panel, in such a way that the first door panel 120 and the second door panel 130 are capable to be slidably positioned at juxtaposed position; and c. a pair of pivot device such as hinges 910 to pivotally mounted one of the door panels 120, 130 to the edge 260 at one of the two door panels 120, 130, such that the doors at juxtaposed position is capable of swinging open about the pivot point on the door frame 810, thereby a widest door opening is obtained via sliding of one of the door panels 120, 130 and the swinging opening of the juxtaposed doors.

FIG. 1B shows a front view showing the opening of the door in accordance with the present invention.

FIG. 1C is a schematic view showing the opening of the door by sliding one of the door panel to be at juxtaposed position with the other door panel in accordance with the present invention.

FIG.2 is a perspective view showing the sliding door system in accordance with the present invention. The sliding door system 100 is mounted as an entrance to a building or a house or the like. There are at least two door panels 120, 130 which are slidable with each other on a door frame 810. The door panel 120 can either be slide to door panel 130 or vice versa, depending on where the pivot device such as a pair of hinges

910 is mounted (as shown in FIG. 3.). The door panels 120, 130 can be either glass panel, wooden panel or any metal panel in accordance with the present invention.

As shown in FIG. 3, there is shown a perspective view of the sliding door system 100 in accordance with the present invention. The door frame 810 has one inner edge being
 5 mounted with the hinges 910 together with one external edge of one of the door panels 120, 130. As shown, the second door panel 130 slides towards the first door panel 120, and the external edge of the first door panel 120 is pivotally hinged to the door frame 810 such that the sliding door system is capable of swinging outward about the hinges 910. Thus, when a limited space is available for the swinging of the door, the second door
 10 panel 140 is first slide toward the first door panel 120. In this case, the required space for the swinging of the door is a minimum. Since the door can be swung outward to a maximum of 180 degree, a maximum entrance or door opening is thus provided and the door panels 120, 130 can be placed at juxtaposed position, the space required for the swinging out of the door does not need to be big. Thus, more space is saved for
 15 entrance mounted with the present sliding door system.

In accordance with a preferred embodiment of the present invention, as shown in FIG. 4 and 5, the sliding of the first door panel 120 and the second door panel 130 are explained. The abutment 210 is positioned at the underneath of the bottom bar of the door, near to one of the bottom corner of the bottom bar 150 of the door panel, and is
 20 slidable within the elongated slots 200 provided at the bottom surface of the bottom bar 150 of each of the door panels 120, 130. The size of the abutment 210 is slidably positioned within the slots 200 such that movement of the first and second door panels 120, 130 is smooth. When the door panels 120, 130 are slide till the abutment 210 touches the end of the slot 200, the movement of the door panels 120, 130 stops.

25 FIG. 5 indicates the sliding movement of the male abutment 510 within the female recess 500 in accordance with the present invention. As shown in the figure, the female recess 500 is positioned at the top surface of the top bar 140 of both the door panels 120, 130. The male abutment 510 is slidably positioned within the female recess 500.

In accordance with a preferred embodiment of the present invention, the sliding door
 30 system is operation based on the steps as follows:

- i. sliding one of the two door panels, either door panel 120 or 130 to the other door panel such that the door panels are at juxtaposed position, which means that the door panels 120, 130 are next to each other;

ii. integrating the first door panel 120 with the second door panel 130 to form one unit; and

iii. upon the door panels 120, 130 are positioned next to each other, swinging open the door which is at juxtaposed position until an opening of a desired width is obtained.

5 Thus, the width of the entrance is extended and the required space to swing out the door is thus a minimum.

The pivot system 910 for instance hinges that are disposed on one edge of the door panel 120, 130 allowing the door panels 120, 130 to be swung opened about the edge of the door panels 120, 130.

10 FIGS. 1A -1G schematically shows the sequences of operating the sliding door system in accordance with the present invention.

It is clear that the present invention provides an innovative door system. The preferred embodiment of the door system includes two door panels 120, 130 which are slidably mounted onto a door frame. The swinging open of the door system provides a bigger
15 entrance.

The invention, as described, may be modified in multiple ways and applied in various technological applications. Although the materials of construction are not described, they may include a variety of compositions consistent with the function of the invention. Such variations are not to be regarded as a departure from the spirit and scope of the
20 invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

CLAIMS:

1. A sliding door system, comprising:
 - a. a door frame having a top inner edge;
 - 5 b. a first door panel and a second door panel which are slidable with each other, characterized in that both the first door panel and the second door panel are provided with a top horizontal bar and a bottom horizontal bar, wherein the base of the bottom horizontal bar of the two panels is provided with elongated slot and one end of each of the base of the two door panels is extended to form an
 - 10 abutment which is slidable within the slots of each of the bottom bar; and the top horizontal bar has a male abutment and a female recess where the male abutment formed on one of the panel is slidable within the recess of the top horizontal bar of the other door panel, whereby the first door panel and the second door panel are capable of slidably positioned at juxtaposed position;
 - 15 c. a pair of pivot device to pivotally mounted one panel of the door to the edge of the one of the two door panels, such that the doors at juxtaposed position is capable of swinging open about the pivot point on the door frame, thereby a widest door opening is obtained via sliding of one door panel and the swinging opening of the juxtaposed doors.
- 20 2. The sliding door system as set forth in claim 1, wherein the door frame is wall-mounted to support the first and second door panel for which the door is pivotally mounted at one edge of the door frame.
- 25 3. The sliding door system as set forth in Claim 1, wherein the door size of the first door panel and the second door panel is identical, or of different size.
- 30 4. The sliding door system as set forth in Claim 1, wherein the female recess on the top horizontal bar of one door panel is provided with a male abutment which will be stopped at the end of the the sliding movement when the edge of one door panel touches the edge of the other panel in the course of a full sliding of the sliding door.
- 35 5. The sliding door system as set forth in Claim 1, wherein the door swings to a maximum of 180 degree.
6. A method of operating a sliding door system of Claim 1 comprising the steps of

- i. sliding one of the two door panel to the other door panel such that the door panels are at juxtaposed position;
 - ii. integrating the first door panel with the second door panel to form one unit; and
 - 5 iii. swinging open the door which is at juxtaposed position until an opening of a desired width is obtained.
7. A method of operating a sliding door system of Claim 6, wherein the first panel and second panel are slidable by way of a female recess and a male abutment slidably
10 mounted thereon.