

SLIDING DOOR

Field of the Invention

The present invention relates, in general, to sliding doors and, more particularly, to a sliding door capable of opening and closing an entrance, such as an entrance to a building or an entrance to a bathroom, and of partitioning the bathing area of the bathroom.

Description of the Prior Art

As well known to those skilled in the art, various types of doors for shielding persons from a dangerous working area, such as welding work area, machine work area or coating work area, and opening and closing devices thereof, are developed. Such opening and closing devices of the doors are designed to be operated automatically or by hand. Particularly, folding or retractable doors are preferably used as such devices since they not only occupy small spaces, but also allow wide entrances.

Such conventional doors and opening and closing devices thereof are disclosed in U.S. patent Nos. 4,635,699, 2,658,571 and 1,960,860.

Particularly, the U.S. patent No. 4,635,699 discloses a retractable safety shield, the shield being made of a plurality of telescopic support members. Parallel guide grooves are formed on one surface of opposite sides of a slot formed on a support member, while mating parallel ribs are formed on the other surface of each of the support members. The support members are slidably interconnected with one another by means of rivets through the slots to cause the guide ribs on one support member to slidably nest within the guide grooves of the adjacent support member. Flexible shields are attached to the lower edges of each of the guide members. However, this shield is problematic in that only a light weight panel, such as a rubber panel or plastic panel, should be used as a shield.

On the other hand, the U.S. patent No. 2,658,571 discloses a folding door construction, capable of selectively opening and closing a wide entrance, such as an entrance to a hangar, by means of a plurality of rigid folding panels. The U.S. patent No. 1,960,860 discloses a sliding door, the sliding door having a plurality of

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folding and slidable panels, the panels being operated by a motor. Still, according to features of these door constructions, a relatively complex structure, in that rails and rollers have to be provided under each of the doors, is required. Therefore, these door constructions are problematic in being applied to places like a bathroom.

A conventional bathroom generally comprises a bathtub, a washbasin and a toilet, installed in a certain area. When a shower is taken in the bathtub, water and soapsuds are dispersed out of the bathtub around the bathroom, thus forcing a user to afterwards clean the whole bathroom. In order to eliminate such inconvenience, a method to separate the bathroom into a bathing area and the remaining area with a shower curtain, a partition or a sliding door, is practiced, thereby preventing dispersion of water and soapsuds to the remaining area. However, such a shower curtain causes problems that the appearance of the bathroom is somewhat spoiled because a support bar should be transversely mounted in the bathroom and a bathing area is reduced because the lower portion of the shower curtain should be in the interior of a bathtub. Regarding the partition, the space of an entrance to the bathtub is reduced because the partition substantially blocks the entrance, and water and soapsuds are dispersed through the unblocked space because the partition may only partially block the entrance. With regard to the sliding door shown in Fig. 1, installation of the door is difficult because an upper frame, a lower frame and two side frames are needed in the installation. Also, as shown in Fig. 1, since the sliding door blocks half the entrance to a bathtub in an opened position, the problem in that the entrance space is reduced still remains, as in the above-mentioned partition. Further, walking and carrying baggage to the interior are interrupted by door frames because sliding grooves or rails are formed on a ceiling and a floor. Since the height of a bathroom differs from building to building, standardization of parts of the door is difficult, thus making the mass production of the door parts difficult.

Additionally, another type of door installed in a bathroom is disclosed in U.S. patent No. 5,417,272. First and second doors are provided on both sides of a door frame, the first door overlapping with the second door, the overlapped first and second doors being rotated to the side wall of a bathroom. Therefore, this

type of door causes problems that the structure and operation of the door is complex, the roller thereof rusts and installation of a rack is difficult.

SUMMARY OF THE INVENTION

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Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a sliding door wherein an entrance through the opened sliding door is widened, mass production of the door parts and installation of a sliding door
10 become easy, and walking and carrying baggage to the interior are not interrupted by door frames.

In order to accomplish the above object, the present invention provides a sliding door, comprising: a door case in the form of a box open at its both sides;

one or more door panels; and a sliding means being mounted to the door
15 panels and allowing the door panels to slide, consisting of a bracket fixed to the door case, having a longitudinal stopper guide slot and a guide groove, one or more sliding bars, individually having a longitudinal stopper guide slot and a guide groove, and one or more sliders, being inserted into the guide grooves, sliding within the guide grooves and having stoppers disposed within the stopper guide
20 slots.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages of the present
25 invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a front view, showing a conventional sliding door installed in a bathroom;

Fig. 2 is a perspective view, showing a sliding door according to the first
30 embodiment of this invention;

Fig. 3 is a perspective view, showing a sliding means of the sliding door in Fig. 2;

Fig. 4 is a sectioned view taken along a line A-A of Fig. 3;

Fig. 5 is a perspective view, showing a door panel assembly according to the second embodiment of this invention;

Fig. 6 is a perspective view, showing a sliding means mounted to the space
5 between two door panels according to the second embodiment;

Fig. 7 is a sectional view, showing two contacting sliding bars with bearings interposed between the bars;

Fig. 8 is a perspective view, showing a door panel assembly according to the third embodiment of this invention.

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DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the accompanying drawings, like elements are given like reference numerals.

15 Fig. 2 is a perspective view showing a sliding door according to the first embodiment of this invention.

As shown in the above drawing, the sliding door of this embodiment comprises a fixed door case 1 and three sliding door panel assemblies. In this embodiment, although the number of the sliding door panel assemblies is three, the number of the sliding door panel assemblies is not limited to three, but is
20 variable. Therefore, the number of the sliding door panel assemblies may be four and the sliding door may comprise a fixed door case and a sliding door panel assembly. Incidentally, although the sliding door may be made of glass, plastic and metal, the material of the sliding door is not limited to these.

25 Three sliding door panel 2, 3 and 4 are allowed to slide by a sliding means 5. The sliding means 5 comprises a fixed bracket 15', one or more rod-shaped sliders 10 and one or more sliding bars 15. Each of the sliders 10 is interposed between and engages with the fixed bracket 15' and the sliding bar 15 or sliding bars 15. The slider 10 is formed with two projecting stoppers 12 and four guide
30 projections 11, the projecting stoppers 12 preventing the slider 10 from being separated from the fixed bracket 15' and the sliding bar 15, the guide projections 11 allowing the slider 10 to engage with both the fixed bracket 15' and the sliding

bar 15. Each of the fixed brackets 15' and the sliding bars 15 is formed with a stopper guide slot 19 and a guide groove 16, the guide slot 19 guiding the stopper 12, the guide groove 16 engaging with and guiding the slider 10. A pair of the sliding bars 15 is mounted along the upper end and the lower end of the door panel 2, while another pair of the sliding bars 15' is mounted along the upper end and the lower end of the door panel 3. On the other hand, the slider 10 should be long enough to hold the door panels 2, 3 and 4 without swing. Although two sliding means 5 are preferably mounted to both the upper and lower ends of the door panels 2, 3 and 4 for forcible support, one sliding means 5 may be selectively mounted to the upper or lower ends of the door panels 2, 3 and 4. Fig. 3 is a perspective view, showing a sliding means of the sliding door in Fig. 2. The sliding means is mounted along the lower ends of the sliding door panels 2, 3 and 4 shown in Fig. 2. The fixed bracket 15' and the sliding bar 15 are formed with the guide grooves 16, each of the guide grooves 16 having an upper, a lower and a side depressions. Additionally, the sliding bars 15' and 15 are formed with the stopper guide slots 19, the stopper guide slot 19 being longitudinally formed along each of the sliding bars 15' and 15. The projecting stopper 12 is inserted into the stopper guide slot 19. Two stoppers 12 are formed on both ends of each of the sliders 10, respectively, while the stoppers 12 projecting in opposite directions. The stoppers 12 restrict the moving distance of the sliders 10 and the sliding bars 15, thereby allowing the sliding door to be fully retracted and to be properly extended. The length of the projecting stopper 12 is dimensioned to eliminate interference between the opposing stoppers 12.

Additionally, a roller 20 may be mounted to the exterior portion of the lower end of the outermost door panel assembly so as to prevent the door panel assemblies from swinging out of their path. Since the sliding means 5 has a firm structure, the roller 20 does not function to support the door panel assemblies, but functions to guide the door panel assemblies along their path. That is, the sliding means 5, connected in the way shown in Fig. 3 and above-described, is capable of supporting vertical loads exerted by the door panels 2, 3 and 4 and so the roller 20 is not necessary to support the door panel assemblies.

Incidentally, a bearing may be provided on the slide way of the guide groove 16 for performing a smooth sliding action of the door panel assemblies. However, when a coated bracket 15', coated sliding bars 15 and aluminum sliders 10 are employed, slide friction may be eliminated. In such a case, the bearing is not essential in the construction of this invention.

The door case 1 is a box open at its both sides. The case 1 is secured to support surfaces, such as a side wall of a bathroom and the upper surface of a bathtub, by a securing means. For example, the door case 1 is secured to the support surfaces of the bathroom using holding brackets.

Fig. 4 is a sectioned view taken along a line A-A of Fig. 3, clearly showing the engagement of the bracket 15', the slider 10 and the sliding bar 15. The slider 10 is inserted into the guide grooves 16. As shown in the drawing, the bracket 15' and the sliding bar 15 may be designed to have engaging projections 14, respectively.

Fig. 5 shows a perspective view of a door panel assembly according to the second embodiment of this invention, and Fig. 6 is a perspective view of a sliding means mounted to the space between two door panels according to this embodiment. In this embodiment, two parallel extending sliding bars, or upper and lower sliding bars 15c, are mounted to the middle portion of each of the front and rear surfaces of the sliding door panel 2 while being spaced apart from each other. The lower surface of the upper sliding bar 15c and the upper surface of the lower sliding bar 15c are formed with guide projections 11, respectively. The guide projections 11 function to guide a slider 10b without swing. A stopper 18 for preventing the slider 10b from being separated and restricting the moving distance of the door panels, is formed on both side end portions of the door panel 2 while projecting in opposite directions. A fixed bracket (not shown) of the sliding means of this embodiment, is constructed in the same way as that of the sliding bar 15c.

Fig. 7 is a sectional view, showing two contacting sliding bars with bearings interposed between the two bars. Two opposing bearing grooves 21a and 21b are provided on the opposing contact surfaces of the sliding bars. A plurality of bearings are inserted into the grooves 21a and 21b so as to facilitate to open and close the sliding door.

Fig. 8 is a perspective view, showing a door panel assembly according to the third embodiment of this invention. A sliding door panel 2 is divided into three panel parts 2a, 2b and 2c. Two integrated sliding bars 15a are respectively mounted to the spaces between two parts of the door panel 2. A longitudinal stopper guide slot 19 is transversely provided on the connecting portion of each of the integrated sliding bars 15a.

The operation according to the embodiment of this invention will be described hereinafter.

All embodiments are similarly operated.

When the outermost door panel 4 is pulled outwardly, the remaining door panels 2 and 3 are pulled outwardly in order. That is, when the outermost door panel 4 is pulled outwardly, the slider 10 is pulled outwardly and so the stopper 12 pulls the next door panel 3 outwardly. This operation is repeated until the sliding door is completely extended.

When the outermost door panel 4 is pushed inwardly, the remaining door panels 2 and 3 are pushed inwardly in order. That is, when the outermost door panel 4 is pushed inwardly, the slider 10 is pushed inwardly and so the stopper 12 pushes the next door panel 3 inwardly. This operation is repeated until the sliding door is completely retracted.

According to this invention, the below advantages are provided.

Since a sliding door may consist of multiple door panel assemblies, an entranceway through the opened sliding door is widened.

Moreover, mass production of the door parts and installation of a sliding door become easy because door frames are not needed for the sliding door of this invention.

Additionally, walking and carrying baggage to the interior are not interrupted by door frames because the door frames are not necessary to be installed.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing

from the scope and spirit of the invention as disclosed in the accompanying claims.

CLAIMS

1. A sliding door, comprising:
a door case in the form of a box open at its both sides;
one or more door panels; and
5 a sliding means being mounted to said door panels and allowing said door panels to slide, consisting of,
a bracket fixed to said door case, having a longitudinal stopper guide slot and a guide groove,
one or more sliding bars, individually having a longitudinal stopper
10 guide slot and a guide groove, and
one or more sliders, being inserted into said guide grooves, sliding within said guide grooves and having stoppers disposed within the stopper guide slots.
- 15 2. The sliding door according to claim 1, wherein said bracket and the sliding bars are individually provided with an upper and lower engaging projections.
3. The sliding door according to claim 1, wherein said bracket and the
20 sliding bars are individually provided with an upper or lower engaging projection.
4. The sliding door according to claim 1, wherein said door panels are multiple and a roller is mounted to the lower end of the outermost door panel.
- 25 5. The sliding door according to claim 1, wherein said door panel is divided into multiple panel parts, with said sliding means being mounted between two adjacent parts of said door panel, thus securing the two adjacent parts together.
6. The sliding door according to claim 1, wherein said sliding bar is divided
30 into upper and lower sliding bars, said upper and lower sliding bars being provided on each surface of said door panel, with upper and lower surfaces of said upper



and lower sliding bars being respectively formed with guide projections, and said slider engaging with said upper and lower sliding bars.

7. The sliding door according to claim 1, wherein said stoppers are
5 provided on said door panels.

8. The sliding door according to claim 1, wherein a plurality of bearings are interposed between two contacting sliding bars.