

PATENT SPECIFICATION

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- (21) Application No. 34437/76 (22) Filed 18 Aug. 1976
(31) Convention Application No. 50/113573U (32) Filed 18 Aug. 1975 in
(33) Japan (JP)
(44) Complete Specification published 20 June 1979
(51) INT. CL.^{*} E06B 5/20 3/36
(52) Index at acceptance
E1J GN



(54) IMPROVEMENTS IN DOORS

(71) We, YOSHIDA KOGYO K.K., a corporation duly organized under the laws of Japan and existing at No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to doors, and more specifically to a door having improved means for making it soundproof.

For soundproofing a door, it has been common practice to form steps on the inside surfaces of a doorframe so that the door when closed may be engaged by the steps via sealing strips of resilient material. This known soundproof door construction has a disadvantage in connection with the step formed on the bottom transverse member of the doorframe, as people passing through the doorway may stumble over the step. Such a step also presents an obstacle to the transportation of heavy articles such as pieces of furniture through the doorway.

The present invention seeks to provide improved means for soundproofing the bottom of a door, such that the surface forming the bottom of a doorway need not have any step, ridge or equivalent means formed thereon which would hamper the passage of people or heavy articles thereover.

According to the invention, there is provided a door for mounting in a doorframe, said door having a channel provided at the bottom, wherein a roller is mounted in said channel and is urged by resilient means against a lower horizontal surface of the doorframe when the door is closed, the roller extending across substantially the entire width of the door.

In order to enhance the soundproofing effect of the roller, this may be made of rubber or like resilient material. If desired, a screen of soundproofing material

such as rubber or the like can be attached to the door so as to ride on the roller, thereby obstructing the passage of sound over the roller.

The invention will now be described in greater detail, by way of example, with reference to the drawings in which:—

Figure 1 is a front elevational view of a door-and-doorframe combination employing the soundproofing means of the invention;

Figure 2 is an enlarged horizontal cross-sectional view, partly broken away, and taken along the line II-II of Figure 1;

Figure 3 is an enlarged vertical cross-sectional view, partly broken away and taken along the line III-III of Figure 1; and

Figure 4 is a fragmentary vertical cross-sectional view similar to Figure 3 but showing, on an enlarged scale, the soundproofing means of this invention as adapted for the door-and-doorframe combination of Figure 1.

In Figure 1, a door 10 is pivotally mounted within a doorframe 11 which comprises a pair of side jambs 12, 13 and a pair of top and bottom transverse members 14, 15, which are combined rectangularly in any convenient manner to define the doorway openably closed by the door 10. The door is hinged at 16 to the left hand side jamb 12 as seen in the drawing.

As shown in Figures 2 and 3, the door 10 comprises a panel 17 of lumber-core plywood or the like and soundproof coverings 18 on both surfaces of the panel. The soundproof coverings 18 may be formed of any such materials as woven fabric, carpet, felt, sheet aluminum, and sheet plastics having roughened surfaces.

Figure 2 also clearly illustrates steps 19 formed on the opposed inside surfaces of the side jambs 12 and 13. Correspondingly, the door 10 has steps 20 formed on and extending along its vertical edges, and soundproof

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sealing strips 21 of rubber or like resilient material are attached to these steps 20. The sealing strips 21 are pressed against the steps 19 on the side jambs 12, 13 when the door 10 is in a closed position within the doorframe 11 as shown.

Figure 3 illustrates a similar step 22 formed on the inside surface of the top transverse member 14 of the doorframe 11, and a corresponding step 23 formed on and extending along the top edge of the door 10. A soundproof sealing strip 24 of rubber or the like is attached to the step 23 on the door 10 so as to be pressed against the step 22 on the top transverse member 14 when the door 10 is closed. The sides and top of the door 10 are thus sealed when the door is closed.

As illustrated in Figure 3 and on an enlarged scale in Figure 4, the door 10 has a recess 25 of inverted T-shaped cross section formed in and extending along its bottom edge. Accommodated in this recess are one or more, two in the illustrated embodiment, rollers 26 of rubber or like resilient material which make rolling engagement with the top surface of the bottom transverse member 15 of the doorframe 11 for soundproofing the bottom of the door 10 in accordance with this invention.

A pair of hollow cylindrical members 27 (one seen), each closed at one end and flanged at the other, are fixedly mounted within the recess 25 at its opposite ends, with their flanged ends directed upwardly. A pin 28 having a collar 29 thereon is housed in each cylindrical member 27 and slidably extends downwardly therefrom through a hole formed in its closed bottom end. Also housed in each cylindrical member 27 is a helical compression spring 30 which engages the collar 29 on the pin 28 for yieldably urging the same downwardly.

The bottom end of each pin 28, projecting out of the respective cylindrical member 27, is rigidly connected to a mounting plate 31. The pair of mounting plates 31 at the opposite ends of the recess 25 rotatably support therebetween the aforesaid pair of rollers 26 in parallel spaced relationship via washers or the like (not shown). When the door 10 is in the closed position, therefore, the pair of rollers 26 are yieldably urged against the top surface of the bottom transverse member 15 of the doorframe 11 under the bias of the compression springs 30. The spacing between the rollers 26 should be suitably determined for optimum soundproofing effects.

Shown at 32 are a pair of strips of rubber or like relatively pliant material designed to obstruct the passage of sound over the rollers 26. Each strip 32 is affixed at one of its transverse edges to one of the opposed surfaces of the door 10 defining the reduced

width portion of the recess 25 and has its other transverse edge portion resting on one of the rollers 26 for relative sliding contact therewith. The strips 32 thus cooperate with the rollers 26 for soundproofing the bottom of the door 10.

According to a further feature of this invention, a pair of cleaning strips 33 of mohair or the like are attached to the bottom edge of the door 10 so as to be located on both sides of, and extend along the full length of, the pair of rollers 26. Each time the door 10 is opened or closed, the cleaning strips 33 slide over the top surface of the bottom transverse member 15 of the doorframe 11 to make the same free from dust or any other foreign matter, thereby permitting the rollers 26 to make clean and positive contact therewith when the door is closed. The provision of these cleaning strips also contributes materially toward the prolongation of the service life of the soundproofing means.

Since the rollers 26 used in the illustrated embodiment of the invention are assumed to be of constant diameter throughout their length, it is desirable that the top surface of the bottom transverse member 15 be disposed higher than the floor on one of its sides toward which the door is to be swung open, only to such an extent that the rollers will not experience any substantial torsional stress while the door is being opened or closed. As clearly shown in Figure 4, the bottom transverse member 15 should preferably be bevelled at 34 to eliminate the step which might otherwise exist between the member 15 and the floor. The bevel 34 thus makes the top surface of the bottom transverse member 15 substantially flush with the floor for all practical purposes, without impairing the soundproofness of the door 10 in any way.

If it is desired to make the top surface of the bottom transverse member 15 exactly coplanar with the floor, there may be employed a taper roller or rollers which become gradually smaller in diameter toward their ends located at the hinged side of the door. Alternatively, the roller or rollers may be transversely divided into a plurality of sections capable of rotation independently of each other.

As will also readily occur to those having ordinary knowledge in the art, an additional soundproof strip of rubber, plastics or like material may be suspended from the top of the recess 25 so as to lie between the pair of rollers 26. Such an additional strip will coact with the soundproof screens 32 to more positively obstruct the passage of sound over the rollers 26.

WHAT WE CLAIM IS:—

1. A door for mounting in a doorframe, said door having a channel provided at the



sealing strips 21 of rubber or like resilient material are attached to these steps 20. The sealing strips 21 are pressed against the steps 19 on the side jambs 12, 13 when the door 10 is in a closed position within the doorframe 11 as shown.

Figure 3 illustrates a similar step 22 formed on the inside surface of the top transverse member 14 of the doorframe 11, and a corresponding step 23 formed on and extending along the top edge of the door 10. A soundproof sealing strip 24 of rubber or the like is attached to the step 23 on the door 10 so as to be pressed against the step 22 on the top transverse member 14 when the door 10 is closed. The sides and top of the door 10 are thus sealed when the door is closed.

As illustrated in Figure 3 and on an enlarged scale in Figure 4, the door 10 has a recess 25 of inverted T-shaped cross section formed in and extending along its bottom edge. Accommodated in this recess are one or more, two in the illustrated embodiment, rollers 26 of rubber or like resilient material which make rolling engagement with the top surface of the bottom transverse member 15 of the doorframe 11 for soundproofing the bottom of the door 10 in accordance with this invention.

A pair of hollow cylindrical members 27 (one seen), each closed at one end and flanged at the other, are fixedly mounted within the recess 25 at its opposite ends, with their flanged ends directed upwardly. A pin 28 having a collar 29 thereon is housed in each cylindrical member 27 and slidably extends downwardly therefrom through a hole formed in its closed bottom end. Also housed in each cylindrical member 27 is a helical compression spring 30 which engages the collar 29 on the pin 28 for yieldably urging the same downwardly.

The bottom end of each pin 28, projecting out of the respective cylindrical member 27, is rigidly connected to a mounting plate 31. The pair of mounting plates 31 at the opposite ends of the recess 25 rotatably support therebetween the aforesaid pair of rollers 26 in parallel spaced relationship via washers or the like (not shown). When the door 10 is in the closed position, therefore, the pair of rollers 26 are yieldably urged against the top surface of the bottom transverse member 15 of the doorframe 11 under the bias of the compression springs 30. The spacing between the rollers 26 should be suitably determined for optimum soundproofing effects.

Shown at 32 are a pair of strips of rubber or like relatively pliant material designed to obstruct the passage of sound over the rollers 26. Each strip 32 is affixed at one of its transverse edges to one of the opposed surfaces of the door 10 defining the reduced

width portion of the recess 25 and has its other transverse edge portion resting on one of the rollers 26 for relative sliding contact therewith. The strips 32 thus cooperate with the rollers 26 for soundproofing the bottom of the door 10.

According to a further feature of this invention, a pair of cleaning strips 33 of mohair or the like are attached to the bottom edge of the door 10 so as to be located on both sides of, and extend along the full length of, the pair of rollers 26. Each time the door 10 is opened or closed, the cleaning strips 33 slide over the top surface of the bottom transverse member 15 of the doorframe 11 to make the same free from dust or any other foreign matter, thereby permitting the rollers 26 to make clean and positive contact therewith when the door is closed. The provision of these cleaning strips also contributes materially toward the prolongation of the service life of the soundproofing means.

Since the rollers 26 used in the illustrated embodiment of the invention are assumed to be of constant diameter throughout their length, it is desirable that the top surface of the bottom transverse member 15 be disposed higher than the floor on one of its sides toward which the door is to be swung open, only to such an extent that the rollers will not experience any substantial torsional stress while the door is being opened or closed. As clearly shown in Figure 4, the bottom transverse member 15 should preferably be bevelled at 34 to eliminate the step which might otherwise exist between the member 15 and the floor. The bevel 34 thus makes the top surface of the bottom transverse member 15 substantially flush with the floor for all practical purposes, without impairing the soundproofness of the door 10 in any way.

If it is desired to make the top surface of the bottom transverse member 15 exactly coplanar with the floor, there may be employed a taper roller or rollers which become gradually smaller in diameter toward their ends located at the hinged side of the door. Alternatively, the roller or rollers may be transversely divided into a plurality of sections capable of rotation independently of each other.

As will also readily occur to those having ordinary knowledge in the art, an additional soundproof strip of rubber, plastics or like material may be suspended from the top of the recess 25 so as to lie between the pair of rollers 26. Such an additional strip will coact with the soundproof screens 32 to more positively obstruct the passage of sound over the rollers 26.

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1. A door for mounting in a doorframe, said door having a channel provided at the



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bottom, wherein a roller is mounted in said channel and is urged by resilient means against a lower horizontal surface of the doorframe when the door is closed, the
5 roller extending across substantially the entire width of the door.

2. A door according to claim 1, wherein the roller is made of resilient material.

3. A door according to claim 1 or claim
10 2, wherein a screen of soundproofing material is attached to the door for obstructing the passage of sound over the roller.

4. A door according to any preceding

claim, wherein a pair of cleaning strips are attached to the bottom of the door so as to
15 be located on both sides of the roller, said cleaning strips sliding over the said horizontal surface for cleaning thereof each time the door is opened or closed.

5. A door substantially as described here-
20 in with reference to the drawings.

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