

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 839 986 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.05.1998 Bulletin 1998/19

(51) Int. Cl.⁶: E06B 9/13

(21) Application number: 96117557.7

(22) Date of filing: 02.11.1996

(84) Designated Contracting States:
CH DE FR GB LI SE

(72) Inventor: Fan, Kenneth S.
Chungo City, Taipei Hsien (TW)

(71) Applicant:
Chain-Tech International Corp.
Chungo City, Taipei Hsien (TW)

(74) Representative:
LOUIS, PÖHLAU, LOHRENTZ & SEGETH
Postfach 3055
90014 Nürnberg (DE)

(54) Door assembly with a vertically-moved door shutter

(57) A door assembly (1) for a door includes a pair of mounting plates (10,10') fixedly attached to two lateral sides of the door and near a top thereof. An axle (20) is fixedly mounted to the mounting plates (10,10') and extends therebetween. A drive wheel (22) and an idling wheel (22') are rotatably mounted on the axle (20). Each of the drive and idling wheels (22,22') defines a series of teeth on its circumferential periphery. An arc-shaped guiding channel (12) is defined on each of the mounting plates (10,10'). A horizontal guiding channel (40) is extended from the arc-shaped guiding

channel (12) toward an inside of the door. A vertical guiding channel (42) is extended from the arc-shaped guiding channel (12) toward a bottom end of the door. A door shutter (30) which is made of a single spring steel sheet and formed to have a corrugated/ribbed configuration has two lateral sides inserted into and guided by the guiding channels (12,40,42) and is engaged with some of the teeth of the drive and idling wheels (22,22') so that when the drive wheel (22) rotates, the door shutter (30) is moved.

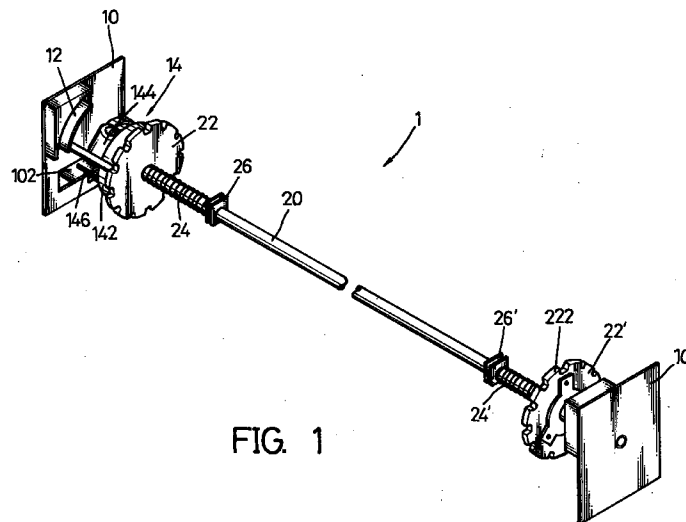


FIG. 1

EP 0 839 986 A1

Description**FIELD OF THE INVENTION**

The present invention relates to a door assembly, particularly to a door assembly with a door shutter which is vertically moved to open or close the door on which the door assembly is installed.

BACKGROUND OF THE INVENTION

A roller door assembly could be very advantageously used as a door for some special sites, for example, a garage or a factory since such a door assembly has a relatively simple structure, can be easily driven by electricity and can conceal an inside of the garage or factory when the door is closed. Such a door assembly generally consists of a motor mounted on a top of the door, a reduction gearing coupled with the motor, a roller coupled with the reduction gearing and laterally extending through the top of the door, a pair of guiding channels defined on two sides of the door, a door shutter made of a plurality of steel strips pivotably connected with each other and having a top edge fixedly connected with the roller and two side edges guided by the guiding channels.

When the motor runs in a first direction, the roller rotates to extend the roller door shutter whereby the door shutter can follow the guiding channels to move downwardly to close the door. When the motor runs on the alternative direction, the roller rotates to wind up the door shutter therearound to open the door.

Although the above mentioned roller door assembly is proved to be able to function well, it still has the following disadvantages.

1. When the conventional roller door assembly is operated, a lot of noise is generated.
2. When the door shutter is wound up or down, significant friction is unavoidably generated between different layers of a roll portion constituted by the door shutter. Such a friction cause scratches on surfaces of the door shutter.
3. When the doorway needs to be relatively high, the door shutter needs to have a relatively large length, which means that the door shutter is relatively heavy. To support such a heavy door shutter, the roller needs to be relatively strong (which is often obtained by increasing the diameter of the roller). To increase the diameter of the roller (which causes that the sizes of the parts constituting the reduction gearing also should be modified) means that the cost for the door assembly must be increased accordingly.

The present invention therefore is aimed to provide an improved door assembly with a vertically-moved door shutter to mitigate and/or obviate the aforemen-

tioned problems.

SUMMARY OF THE INVENTION

An objective of the present invention is to provide a door assembly which has the advantages of the conventional roller door assembly but without the disadvantages thereof.

Another objective of the present invention is to provide a door assembly with a door shutter vertically moved wherein when the door assembly is operated little noise will be generated.

A further objective of the present invention is to provide a door assembly with a door shutter vertically moved wherein a movement of the door shutter will not cause scratches on surfaces of the door shutter.

A still further objective of the present invention is to provide a door assembly with a door shutter vertically moved wherein when the door shutter is driven to move upwardly to open the door, the door shutter does not wind up on a drive wheel and an idling wheel of the present invention which are rotatably mounted on an axle, so that the weight of the door shutter will not entirely supported by the axle, whereby even when the door shutter is relatively heavy since it has a large length, the diameter of the axle does not need to be increased.

Other objectives, advantages, and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing a main portion of a door assembly in accordance with the present invention;

Fig. 2 is an enlarged perspective view showing the details of a left side part of Fig. 1 wherein a door shutter shown by phantom lines, a vertical guiding channel and a horizontal guiding channel are added thereto;

Fig. 3 is generally a right side view of Fig. 2; and Fig. 4 is a perspective view showing a preferred embodiment of a door shutter in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figs. 1 to 3, a main portion of a door assembly 1 in accordance with the present invention comprises a pair of mounting plates 10, 10' for mounting the door assembly 1 on two sides of a top of a door (not shown). An axle 20 is fixedly mounted on the two mounting plates 10, 10' and extended therebetween. A drive wheel 22 and an idling wheel 22' are rotatably mounted on the axle 20 and located respectively near

the mounting plate 10 and 10'. A pair of springs 24, 24' respectively have a first end fixedly connected with the drive wheel 22 and the idling wheel 22' and a second end fixedly connected with one of a pair of anchors 26, 26' which in turn are fixedly mounted on the axle 20. When the drive wheel 22 and idling wheel 22' rotate, the springs 24, 24' are twisted. Such springs 24, 24' are used to store energy when a door shutter 30 is driven to move downwardly. The energy stored in the springs 24, 24' is used to facilitate the lifting of the door shutter 30.

A bracket 102 is fixedly attached to an inside of the mounting plate 10. An electric driving mechanism 14 is used to drive the drive wheel 22. The driving mechanism 14 includes a motor 144 mounted on the bracket 102, and a reduction gearing/clutch unit 142 having an input side coupled with the motor 144 and an output side selectively coupled with the drive wheel 22 by controlling the position of a control rod 146. When the control rod 146 is moved to a specific position, the drive wheel 22 is decoupled from the reduction gearing/clutch unit 142 whereby the door shutter 30 of the present door assembly 1 is manually motivated. Alternatively, the door shutter 30 can be motivated by the motor 144.

Since the driving mechanism 14 is not concerned with the inventive characteristics of the present invention and has been disclosed by Taiwan Utility Model Patent No. 94656, a detailed description thereof is omitted here.

A door shutter guiding channel consisting of a horizontal guiding channel 40, an arc-shaped guiding channel 12 and a vertical guiding channel 42 is defined on each of the mounting plates 10, 10' and extends therefrom. However, in the drawings only the guiding channel concerning the mounting plate 10 is shown. The arc-shaped guiding channel 12 is defined by a block 122 having a configuration like a right-angled triangle and defining an arc-shaped side and an arc-shaped plate 124 opposite to the arc-shaped side. The horizontal guiding channel 40 is defined by a first pair of flat steel plates 402, 404 horizontally extending inwardly respectively from rear, top ends of the block 122 and plate 124 to a position wherein the length of the horizontal guiding channel 40 is substantially the same as that of the door shutter 30. The vertical guiding channel 42 is defined by a second pair of flat steel plates 422, 424 vertically extending downwardly respectively from front, bottom ends of the block 122 and plate 124 to a bottom of the door.

Each of the drive wheel 22 and idling wheel 22' is made of hard plastics and defines a series of teeth 222 around its circumferential periphery. The door shutter 30 is made of a single spring steel sheet and is formed to have a corrugated/ribbed configuration with a plurality of concave portions 302 and convex portions 304. When the door shutter 30 is extended around the drive wheel 22 and idling wheel 22' (as better seen in Fig. 3 wherein the door shutter 30 is extended around the drive wheel 22), some of the concave portions 302 are

engaged with recesses between some of the teeth 222 and some of the convex portions 304 are engaged with some of the teeth 222, whereby when the drive wheel 22 rotates, the door shutter 30 can be driven to move upwardly or downwardly. Two lateral edges of the door shutter 30 are inserted into the door shutter guiding channels.

When the door shutter 30 is being driven to move upwardly to open the doorway, the upper portion of the door shutter 30 is guided to run along the horizontal guiding channels 40 and supported by the flat steel plates 404 defining the channels 40, rather to wind up on the drive wheel 22 and idling wheel 22' so that the weight of the door shutter 30 will not be supported entirely by the axle 20.

Furthermore, since the door shutter 30 is not wound up on the driving disks 22, 22', when the door shutter 30 is driven to move downwardly or upwardly, any part of the door shutter 30 will not be in contact with any other part, whereby scratches on the surfaces of the door shutter of prior art generated due to friction between different layers of the roll formed by the prior art door shutter will not happen in the present invention.

Moreover, since the drive wheel 22 and idling wheel 22' are made of plastics, the noise generated due to the drive wheel 22 and idling wheel 22' engaging the door shutter 30 is not significant.

Fig. 4 shows a preferred embodiment of the door shutter 30. The door shutter 30 includes a plurality of sliders 32 fixedly attached at an underside of some of the convex portions 304 and configured to have a semi-circular shape with a tip protruding from the two lateral edges of the door shutter 30. When the door shutter 30 is guided to move along the guiding channels, only the tip of each of the sliders 32 will contact inner walls of the guiding channels. Furthermore, two flexible strips 34 made of nylon fabric or the like are attached to two sides of a surface of the door plate 30 which will be in contact with the flat steel plates 404, 424 and the arc-shaped plate 124, when the door shutter 30 is driven to move along the guiding channels. By such a design of the door shutter 30, when the door shutter 30 is driven to move along the guiding channels, the noise generated thereby can be of a minimum level.

Although this invention has been described with a certain degree of particularity, it is to be understood that the present disclosure has been made by way of example only and that numerous changes in the detailed construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

Claims

1. A door assembly for a door defining a top end, a bottom end and two lateral sides, comprising:

a pair of mounting plates fixedly attached on

the lateral sides of the door and near the top end thereof;

an axle fixedly mounted on the two mounting plates and extending therebetween;

a drive wheel and an idling wheel rotatably mounted on the axle, each of the drive and idling wheels defining a series of teeth on a circumferential periphery thereof;

an electrical driving means for driving the drive wheel to have a rotational movement;

a door shutter made of a single spring steel sheet and formed to have a corrugated/ribbed configuration defining a plurality of convex and concave portions, the door shutter engaging with the teeth of the drive and idling wheels whereby when the drive wheel rotates, the door shutter is moved; and

a guiding means for guiding a first portion of the shutter door above the drive and idling wheels to have a substantially horizontal movement and a second portion of the shutter door below the drive and idling wheels to have a substantially vertical movement.

2. The door assembly in accordance with Claim 1, wherein the guiding means comprises an arc-shaped channel defined in each of the mounting plates, a horizontal guiding channel extending from the arc-shaped channel toward an upper interior of a room in which the door assembly is installed, and a vertical guiding channel extending from the arc-shaped channel toward the bottom end of the door and wherein the door shutter comprises two lateral sides inserted into the guiding means.

3. The door assembly in accordance with Claim 1, wherein the electrical driving means comprises a motor and a reduction gearing/clutch unit having an input side coupled with the motor and an output side selectively coupled with the drive wheel.

4. The door assembly in accordance with Claim 3, wherein the electrical driving means further comprises a control rod for controlling the coupling between the reduction gearing/clutch unit and the drive wheel.

5. The door assembly in accordance with Claim 1, wherein two springs have first ends respectively fixedly connected to the drive and idling wheels and second ends fixedly connected to the axle whereby when the drive wheel is rotated to motivate the door shutter to close the door the springs are twisted.

6. The door assembly in accordance with Claim 2, wherein the shutter door is further provided with a plurality of sliders made of hard plastics, said sliders being fixedly attached to the two lateral sides of

the shutter door and protruding sideways therefrom.

7. The door assembly in accordance with Claim 2, wherein two flexible strips made of fabric are attached to door shutter, said two strips being so positioned that they are respectively in contact with walls defining the arc-shaped, horizontal and vertical guiding channels.

8. The door assembly in accordance with Claim 7, wherein the flexible strips are made of nylon fabric.

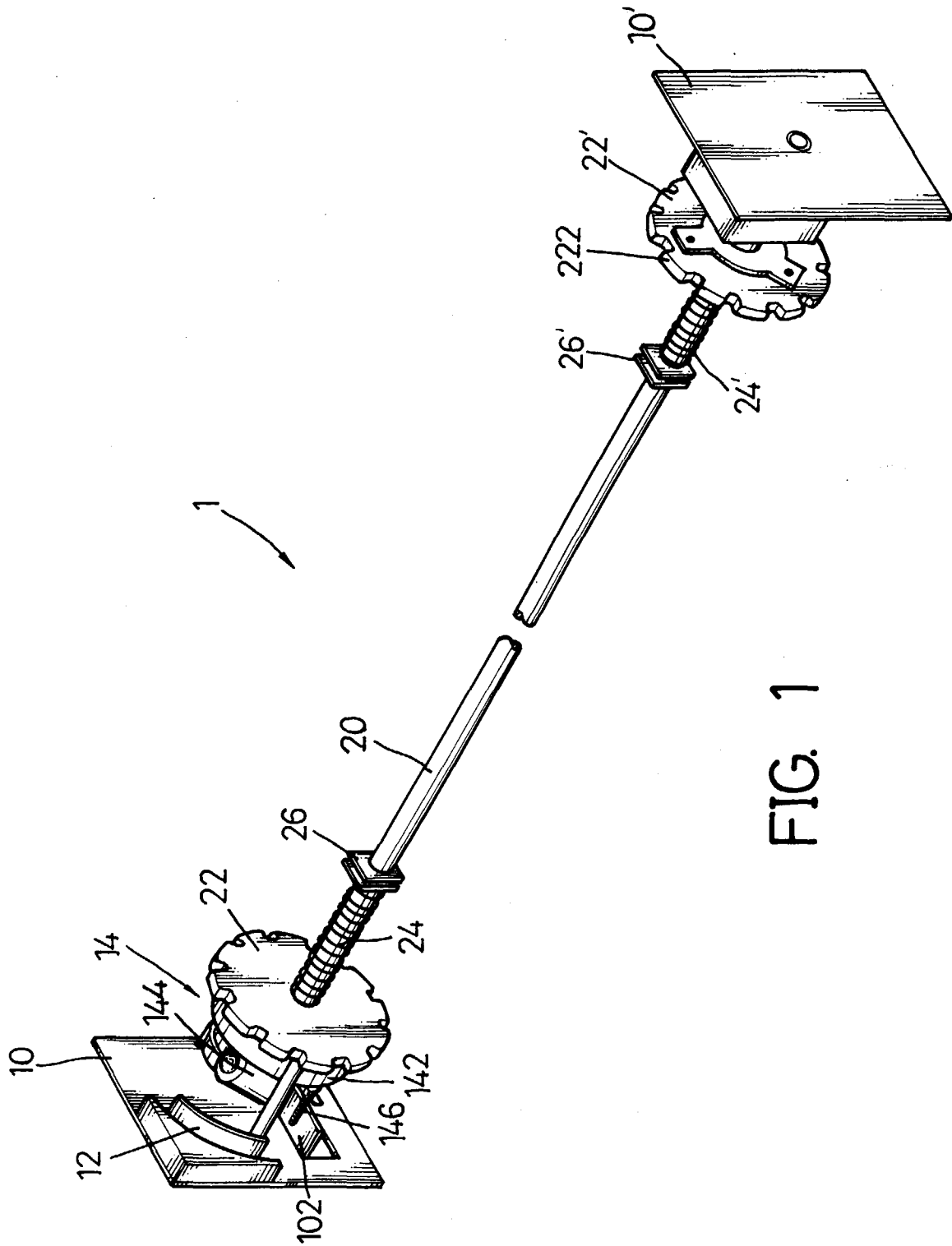


FIG. 1

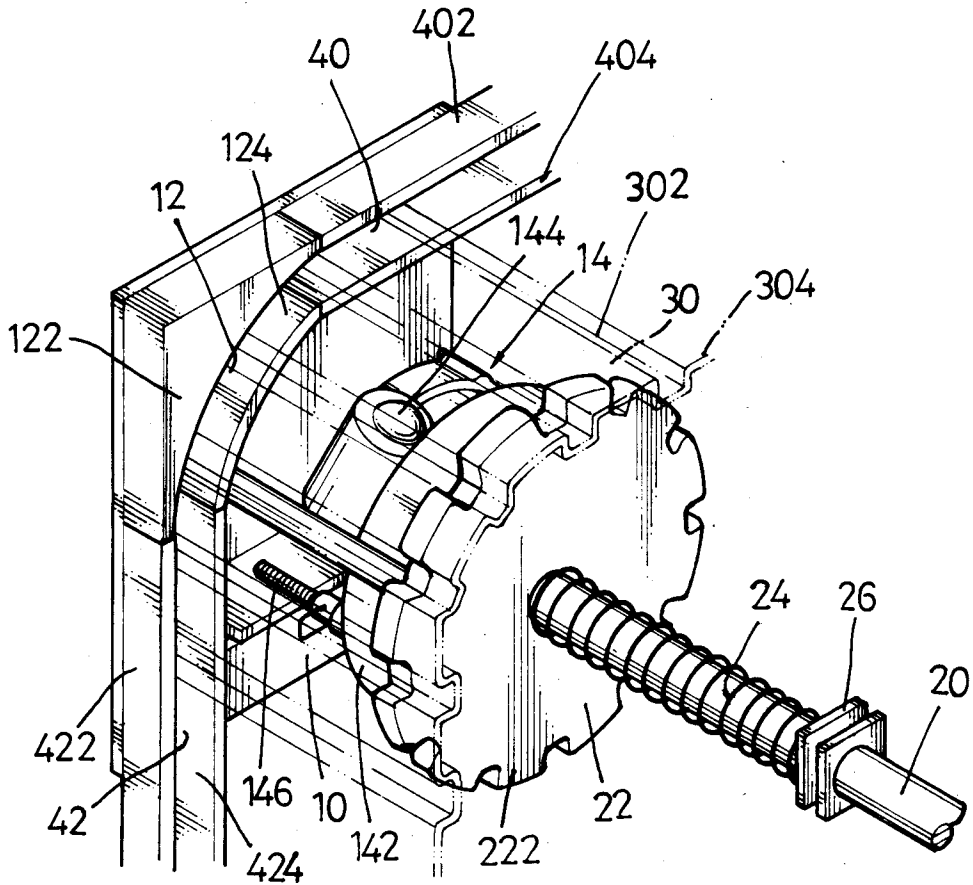


FIG. 2

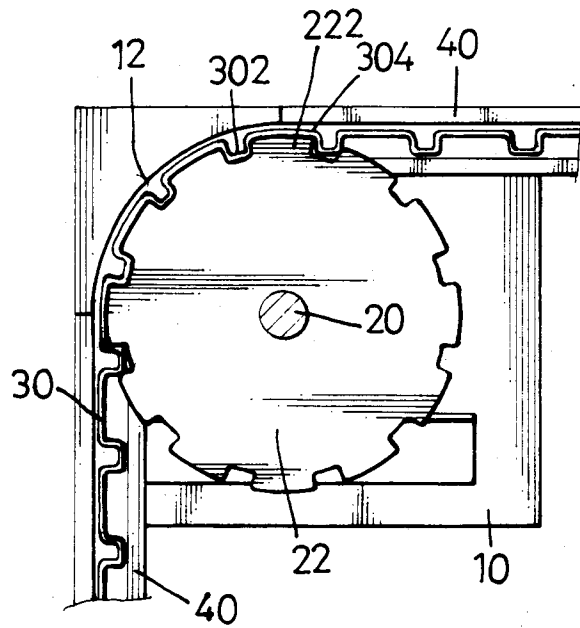


FIG. 3

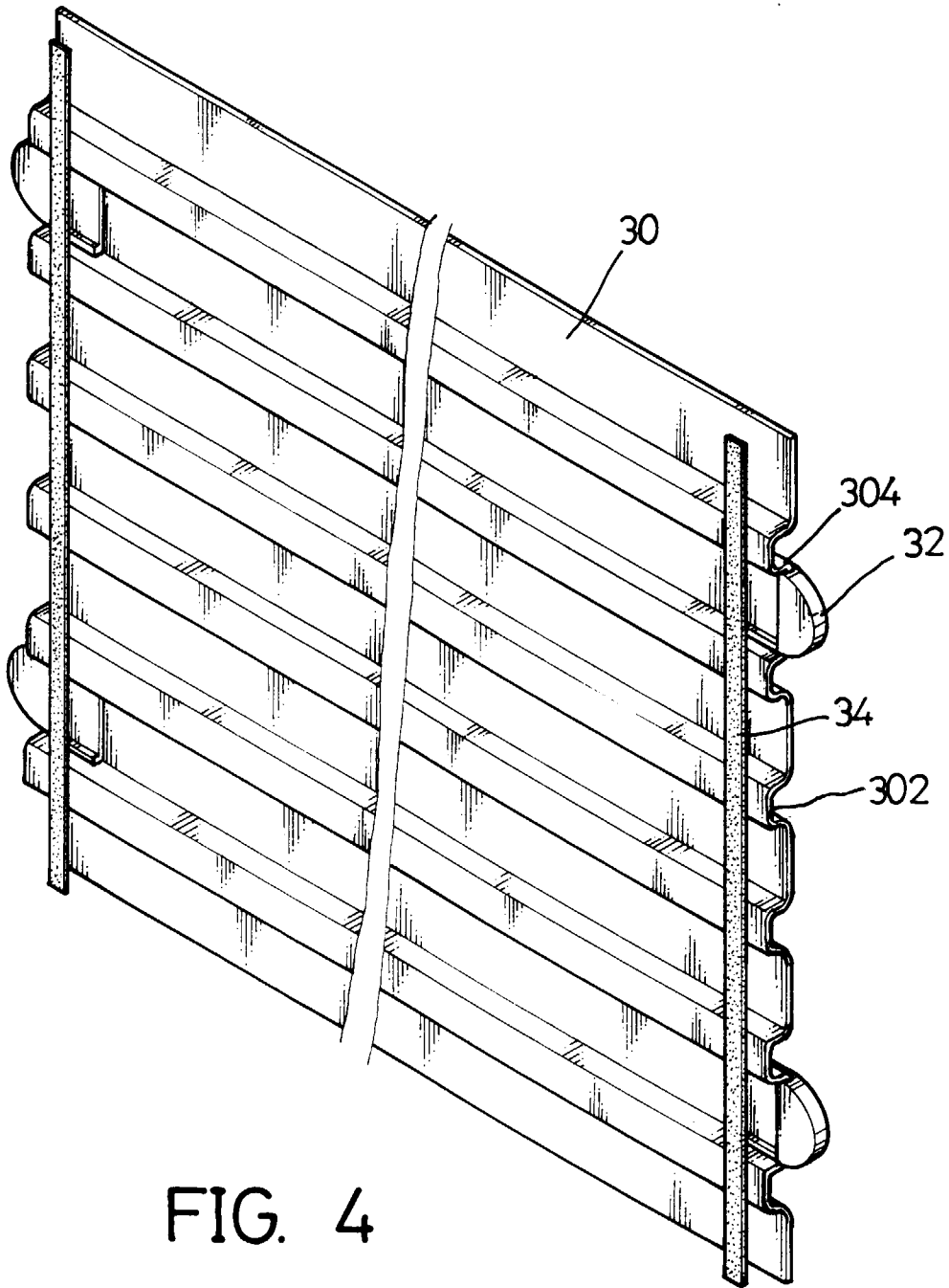


FIG. 4



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 11 7557

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.8)
A	EP 0 371 527 A (POLYNORM) * the whole document * ---	1,2,5	E06B9/13
A	EP 0 252 839 A (MAC GREGOR-NAVIRE) * the whole document * -----	1,3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.8)
			E06B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
BERLIN		2 April 1997	KRABEL A.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/82 (F04/C01)