

Printed Sticker for Moving Escalator Handrails

Technical Field of the Invention

This invention is concerns technology of advertising printed sticker on escalator handrails.

Background of the invention

Because the sticker is constantly moving on an escalator (or moving sidewalk) handrail, and because of the high physical contact with users, the printed sticker requires protection from wear and friction.

Summary of the Invention

This invention is offered as a solution to problems of conventional technology in this field. This invention supplies a printed sticker for escalator handrails that is sufficiently resistant to wear and friction.

To achieve this purpose, the Printed Sticker for Moving Escalator Handrails has the following characteristics:

It is made from a white, glossy polypropylene-group special olefin film, which has a sticky acrylic layer for attachment to the escalator handrail on one side, and printed advertisement (or other printed material) on the other side. After this is applied to the escalator handrail, the escalator handrail with the printed sticker is laminated with a transparent polyurethane film which has a sticky acrylic layer for attachment to the escalator handrail on one side.

The Printed Sticker for Moving Escalator Handrails has the following characteristics:

It is made from a white, glossy polyurethane special urethane film, which has a sticky acrylic layer for attachment to the escalator handrail on one side, and printed advertisement (or other printed material) on the other side. After this is applied to the escalator handrail, the escalator handrail with the printed sticker is laminated with a transparent polyurethane film which has a sticky acrylic layer for attachment to the escalator handrail on one side.

The Printed Sticker for Moving Escalator Handrails has the following characteristics:

It is made from a white unpolished polyethylene special olefin film, which has a sticky acrylic layer for attachment to the escalator handrail on one side, and printed advertisement (or other printed material) on the other side. After this is applied to the escalator handrail, the escalator handrail with the printed sticker is laminated with a transparent polyurethane film which has a sticky acrylic layer for attachment to the escalator handrail on one side.

Brief Explanation of the Drawings

Figure 1 is the plan of the printed sticker fixed on a moving handrail.

Figure 2 is the A-A line sectional view of Fig. 1

Figure 3 is the sectional view showing the process of manufacture a printed sticker based on this invention.

Figure 4 is the sectional view showing the process of manufacture a printed sticker in another form of operation, based on this invention.

Figure 5 is the sectional view showing the process of manufacture a printed sticker in another form of operation, based on this invention.

Figure 6 is the side view showing the automatic sticker application apparatus.

Figure 7 is the plan of the automatic sticker application apparatus.

Figure 8 is the front view of the automatic sticker application apparatus.

Figure 9 is the back view of the automatic sticker application apparatus.

Explanation of Reference Numerals

- | | |
|-------|--|
| 1 | Side plate |
| 2 | Spacer |
| 3 | auxiliary side plate 3 |
| 4 | supply winder |
| 5 | axis of rotation |
| 6 | gear |
| 7 | guide-plate |
| 8 | bearing |
| 9 | gear |
| 10 | the friction disc |
| 11 | gear |
| 12 | collection winder |
| 13 | axis of rotation |
| 14,15 | bearing |
| 16 | gear |
| 17 | the small gear |
| 18 | printed sticker |
| 18a | a transparent polyurethane film |
| 18b | sticky acrylic layer |
| 18c | kraft paper |
| 18d | the printed layer |
| 18e | white glossy polypropylene-group special olefin film |
| 18f | sticky acrylic layer |
| 18g | white glossy polyurethane special urethane film |
| 18h | white unpolished polyethylene special olefin film |
| 19 | peel-away paper |
| 20 | the separation rollers |
| 21 | separation rollers |
| 22 | stop pin |
| 23 | item |
| 24 | bearings |
| 25 | press roller |
| 26 | pivot |
| 27 | arm |

28	pressure adjustment screw
29	moving handrail
30	brush
31	fixed plate
32	brush attachment arm
33	pivot
34	stop screw
35	brush
36	brush installation plate
37	height adjustment screw
38,39,40	brush groups
41	fixed plate
42,43	support roller
44,45	support plate
46	handrail guidance rail
47,48	screw clamp
49,50	item
51	connector
52	arm
53	putt
54	step of the escalator

Mode (embodiments) of the invention

The details of the mode/embodiments of the invention will be explained with figures and drawings. Figure 1 shows the layout of the escalator. Figure 2 is a cross-section of a handrail. In these figures, the printed sticker 18 is fixed onto the handrail 29 located beside the steps 54.

Below, the composition of this printed sticker 18 is explained.

Figure 3(a) shows white glossy polypropylene-group special olefin film 18e [60 μ m thickness], which has a sticky acrylic layer 18f [25 μ m] for attachment to the escalator handrail on one side, and printed advertising (or other materials) on the other. The sticky layer is covered with kraft (paper) 19 [90 μ m].

The advertising on the printed side of film 18e is printed on-demand, and so it may be printing using rotary press, relief printing, etc.

In Figure.3(b), kraft paper 18c [90 μ m] is attached to a transparent polyurethane film 18a [100 μ m] which has a sticky acrylic layer 18b[90 μ m] .

In Figure.3(c),a transparent polyurethane film 18a, with the kraft paper 18c [90 μ m] removed, is fixed on the printed layer 18d of the white glossy polypropylene-group special olefin film 18e.

After these processes, the laminated printed sticker 18 consists of printed white glossy polypropylene special olefin film 18e and protective film, the transparent polyurethane film 18a.

After cutting printed sticker 18 into one of the predetermined sizes, it is fixed onto the moving handrail by the Automatic Sticker Application Apparatus.

Next, a variation of the composition printed sticker18 will be explained.

In Fig.4(a), a white glossy polyurethane special urethane film 18g[50 μ m], which has a sticky acrylic layer 18f [25 μ m] for attachment to the escalator handrail on one side and printed advertising (or other material) on the other side. Kraft paper 19 [90 μ m] is used to cover the to the sticky layer.

The advertising on the printed side of film 18g is printed on-demand, and so it may be printing using rotary press, relief printing, gravure-printing etc.

In Figure.4(b), kraft paper 18c [90 μ m] is attached to a transparent polyurethane film 18a [100 μ m] which has a sticky acrylic layer 18b [90 μ m].

In Figure 4(c), a transparent polyurethane film 18a, with the kraft paper 18c[90 μ m] removed, is fixed onto the printed layer 18d of the white glossy polyurethane special polyurethane film 18g.

After these processes, the laminated printed sticker 18 consists of printed white glossy polyurethane special polyurethane film 18g and protective film, the transparent polyurethane film18a.

Next, another variation of the composition printed sticker18 will be explained.

In Figure 5(a), a white unpolished polyethylene special olefin film 18h[100 μ m], which has a sticky acrylic layer 18f [25 μ m] for attachment to the escalator handrail on one side and printed advertising (or other material) on the other. Kraft paper 19[90 μ m] is used to cover the sticky layer.

The advertising on the printed side of film 18h is printed on-demand, and so it may be printing using rotary press, relief printing etc.

In Figure 5(b), kraft paper 18c [90 μ m] is attached to a transparent polyurethane film 18a [100 μ m] which has a sticky acrylic layer 18b [90 μ m].

In Figure 5(c), a transparent polyurethane film 18a, with the kraft paper 18c [90 μ m] removed, is fixed on the printed layer18d of the white unpolished polyethylene special olefin film 18h.

After these processes, the laminated printed sticker 18 consists of printed white unpolished polyethylene special olefin film 18h and protective film, the transparent polyurethane film 18a.

The following concern the actual testing of the printed stickers of Figures 3 and 5.

Testing performed by: HITACHI, Ltd. Building Systems Group, The Headquarters of MITO Building Systems

Testing procedure: Standard testing for fixing sticker to escalator handrail at HITACHI factory laboratories.

Testing environment temperature – 5°C – 30°C, humidity 70%.

Test duration: February 3, 2002 – March 26 (about 1000 hours of durability testing).

Test results: The printed sticker passed HITCAHI Ltd durability testing.

After the 500 hours the printed sticker was on an operating escalator, there were no problems with wear from general operation, wear from friction, displacement or movement of the sticker, peeling of any of the layers (sticky layer etc.) of any kind, or wrinkling of the sticker etc.

Hereafter, mode/embodiments of the Automatic Sticker Application Apparatus is explained in detail from drawings.

Figure 6, shows the side view of the Automatic Sticker Application Apparatus. Figure 7 shows the plane view. Figure 8 shows the front view, and figure 9 shows the rear view.

In these figures, the auxiliary side plate 3 is attached to the base serving side plate 1 through spacers 2. The supply winder axis of rotation 5 is supported by bearings 6, installed in the side plate 1. The brim or guard of the supply winder 4 is shown by 7. Outside the side plate 1, gear 9 is attached to the outside portion of the supply winder axis of rotation, and is supported by bearing 8, which is installed in the auxiliary side plate 3. This gear 9 engages gear 11 of the friction disc 10

The axis of rotation 13 of the collection winder 12 is attached in the side plate 1 and the auxiliary side plate 3, and is supported by bearings 14 and 15, which are installed in the side plate and auxiliary side plate respectively. A one-way clutch is built into the collection winder 12. Moreover, by way of the friction disc 10 gear 16 engages the small gear 17, which is attached to the collection winder axis of rotation 13. Therefore, rotation of the supply winder 4 transfers motion to the friction board 10, which is then transmitted to gear 16, which in turn engages gear 17, which then powers the collection winder 12.

The underside of the printed sticker 18 is an adhesive layer, covered with peel-away paper 19 when it leaves the supply winder 4. The separation rollers 20 and 21 are attached in the lower part of the side plate 1 and separate the printed sticker 18 from the peel-away paper 19. These separation rollers rotate freely on their axes. The stop pin 22 attaches the starting edge of the separated peel-away paper 19 to the collection winder 12 so it can be wound. In Figure 6, item 23 is attached to the side of the collection winder 12 to lock the fixing pin 22.

The pivot 26 extends from the side plate 1 and acts as a fulcrum. Press roller 25 is supported by bearings 24 and rotates freely on its axis. The press roller is attached to arms 27, which extend from the pivot 26. The pressure adjustment screw 28 is attached at the opposite end of arms 27. By turning the pressure adjustment screw 28, we can adjust how strongly the press roller 25 sticks the printed sticker 18 to the moving handrail 29. Brush 30 is attached to the bottom of arms 27 before the pressure

adjustment screw 28. Brush 30 further pushes the printed sticker 18 onto the moving handrail 29.

Fixed plate 31 is attached at a right angle to side plate 1. Pivot 33 is attached to the fixed plate 31. The brush attachment arm 32 is attached to the pivot 33 and forms a right angle with the front face of the fixed plate 31. The arm 32 can rotate on the pivot 33. 34 denotes the fixed screw. Brush 35 is attached to the bottom of arm 32. The brush 35 pushes and further sticks the sides of the printed sticker 18 onto the top of the rounded corners of the moving handrail 29.

The brush installation plate 36 is installed at the front of arm 32 so that the brush installation plate 36 can be put on and cover both sides of the moving handrail. The brush attachment board 36 can be adjusted to the height of the moving handrail 29 by turning the height adjustment screw 37. Inside the brush attachment plate 36 on both sides, the brush groups 38, 39, and 40 are attached so that both the edges of the printed sticker 18 can be gradually and progressively stuck down both sides the moving handrail 29, until it is securely fastened.

Fixed plate 41 is attached at the back of side plate 1 at a right angle. Support roller 42 is attached to fixed plate 41 and support roller 43 is attached to the fixed plate 31. Support rollers 42 and 43 support the entire apparatus and rest on top of the moving escalator 29. The figures also diagram support rollers 42 and 43 attached to support plates 44 and 45.

Stabilizing screw clamps 47 and 48 are screwed through fixed plates 41 and 31 respectively. Stabilizing screw clamps pinch the handrail guidance rail 46 from both sides, and secure the apparatus to the escalator, preventing it from moving. securing tips 49 and 50 are at the end of the stabilizing screw clamps 47, 48 and that pinch the escalator handrail guidance rail 46. Connector 51 attaches arm 52 to side plate 1. Putt 53 is attached to arm 52. Putt 53 further stabilizes the entire apparatus on the escalator. Arm 52 and 53 are support/stabilizing structures.

The following will explain the operation of the Automatic Sticker Application Apparatus.

First, the printed sticker 18 with its adhesive underside covered with peel-away paper 19, is sent out from supply winder 4, and the printed sticker 18 and the peel-away paper 19 are separated by the separation rollers 20 and 21. The collection winder 12 collects the separated peel-away paper 19.

The printed sticker 18 is stuck to the surface of the moving handrail 29 by press roller 25. In Figure 6, the moving handrail 29 is moving to the right. As the supply winder 4 continuously sends out the printed sticker 18, it transfers motion to the friction disc 10, which in turn transfers motion to the collection winder 12, which collects the separated peel-away paper 19.

Brush 35 pushes the sides of the printed sticker 18 further onto the moving handrail 29

so that the sticker 18 is slightly bent at the rounded corners of the moving handrail. Then, brushes 38, 39 and 40 press and fix the printed sticker 18 onto the sides of the moving handrail 29. The printed sticker 18 is fixed onto the surface of the moving handrail 29 as shown in figures 1 and 2. Figure 1 also shows the step of the escalator 54. Figure 2 also shows the printed sticker 18 covering the surface of a moving handrail 29. Because the printed sticker 18 edges reach around the sides and near the bottom of the moving handrail 29, it acts as preventive measure to unwanted removal as it is difficult for fingers to reach in and pull the edges of printed sticker 18 off from their placement.

Effects of the Invention

As mentioned above, the printed sticker is composed of one of three films: a white, glossy polypropylene-group special olefin film, a white, glossy polyurethane special urethane film, or a white unpolished polyethylene special olefin film, and protective film lamination: a transparent polyurethane film which has a sticky acrylic layer for attachment to the escalator handrail on one side. It has the benefit of reducing friction on the printed advertising and handrail.

White, glossy polypropylene-group special olefin film, white, glossy polyurethane special urethane film, and white unpolished polyethylene special olefin film are all flexible, and easily and smoothly placed on curved surfaces, making them very suitable for application onto moving escalator handrails.

Claims

1. The Printed Sticker for Moving Escalator Handrails has the following characteristics: it is made from a white, glossy polypropylene-group special olefin film, which has a sticky acrylic layer for attachment to the escalator handrail on one side, and printed advertisement (or other printed material) on the other side. After this is applied to the escalator handrail, the escalator handrail with the printed sticker is laminated with a transparent polyurethane film which has a sticky acrylic layer for attachment to the escalator handrail on one side.
2. The Printed Sticker for Moving Escalator Handrails has the following characteristics: it is made from a white, glossy polyurethane special urethane film, which has a sticky acrylic layer for attachment to the escalator handrail on one side, and printed advertisement (or other printed material) on the other side. After this is applied to the escalator handrail, the escalator handrail with the printed sticker is laminated with a transparent polyurethane film which has a sticky acrylic layer for attachment to the escalator handrail on one side.
3. The Printed Sticker for Moving Escalator Handrails has the following characteristics: it is made from a white unpolished polyethylene special olefin film, which has a sticky acrylic layer for attachment to the escalator handrail on one side, and printed advertisement (or other printed material) on the other side. After this is applied to the escalator handrail, the escalator handrail with the printed sticker is laminated with a transparent polyurethane film which has a sticky acrylic layer for attachment to the escalator handrail on one side.