



(11) **EP 2 043 058 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.04.2009 Bulletin 2009/14

(51) Int Cl.:
G07D 7/12 (2006.01)

(21) Application number: **08163099.8**

(22) Date of filing: **27.08.2008**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT
RO SE SI SK TR**
Designated Extension States:
AL BA MK RS

(72) Inventors:
• **Iwai, Koji**
Isesaki-shi Gunma 372-8502 (JP)
• **Katou, Hiroshi**
Isesaki-shi Gunma 372-8502 (JP)

(30) Priority: **27.09.2007 JP 2007251338**

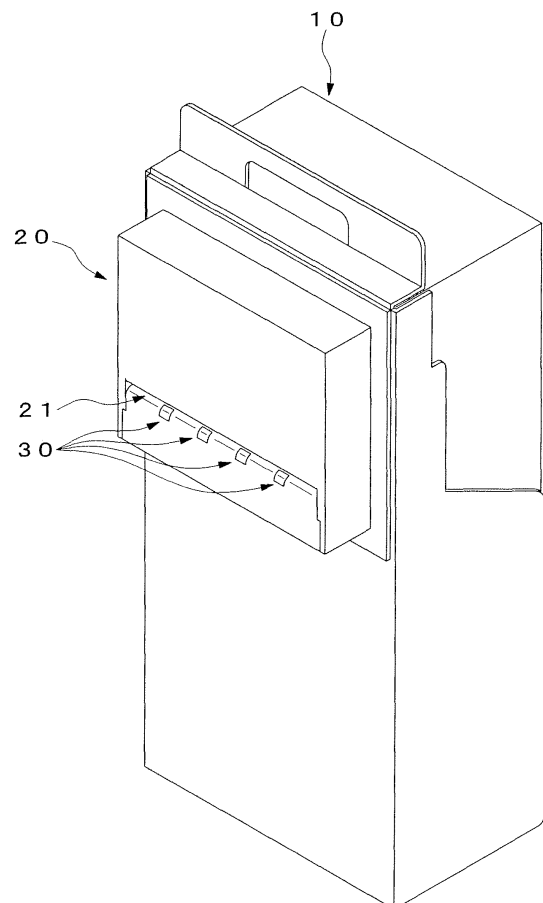
(74) Representative: **Haley, Stephen**
Gill Jennings & Every LLP
Broadgate House
7 Eldon Street
London EC2M 7LH (GB)

(71) Applicant: **Sanden Corporation**
Isesaki-shi,
Gunma 372-8502 (JP)

(54) **Bank note identification device**

(57) The present invention provides a bank note identification device allowing a light emitting part to be arranged arbitrarily despite the position of a light source. That is, the light emitting part includes an opening provided in a guide on a lower side, a light source provided in the vicinity of a paper currency put-in slot and an optical guiding member guiding light of the light source to the opening. Thereby, no light source is required to be arranged on the rear side surface of the opening and the light emitting part can be arranged arbitrarily despite the position of the light source. Therefore, degree of freedom in designing can be improved.

F i g . 1



EP 2 043 058 A2

Description

[0001] The present invention relates to a bank note identification device provided in automatic venders and change makers to authenticate a paper currency and to house it.

[0002] Conventionally, such a bank note identification device is known to comprise a pair of guides provided so as to be positioned respectively on both sides of a put-in paper currency and configure a paper currency put-in slot and a plurality of light emitting parts arranged to keep distance from each other in at least one of a pair of the guides along the paper currency put-in slot.

[0003] For a conventional bank note identification device, the light emitting part is configured by directly providing the light emitting part with a light source such as a light emitting diode (LED) or by providing a light source on the rear side surface of an opening in the position corresponding to the light emitting part. Therefore, in the case of providing the guide with the light emitting part, space for arranging the light source, a substrate and the like on the rear side surface is required. Therefore, the light emitting part cannot be arranged arbitrarily.

[0004] An object of the present invention is to provide a bank note identification device allowing a light emitting part to be arranged arbitrarily despite the position of a light source.

[0005] In order to attain the above described object, the present invention comprises a pair of guides provided so as to be respectively positioned on both sides of a put-in paper currency and configuring a paper currency put-in slot; and a light emitting part including a plurality of openings arranged to keep distance from each other in at least one of a pair of the guides along the paper currency put-in slot, a light source provided in the vicinity of the paper currency put-in slot and an optical guiding member guiding light of the light source to the openings.

[0006] Thereby, since light of the light source is guided to the opening by the optical guiding member, the light emitting part can be arranged arbitrarily despite the position of the light source. Accordingly, since the light emitting part can be arranged arbitrarily despite the position of the light source, degree of freedom in designing can be improved.

[0007] The above described object and the other objects, characteristics and benefits of the present invention will become obvious by the following description and the accompanying drawings.

[0008] In the Drawings;

FIG. 1 is an entire perspective view of a bank note identification device illustrating an embodiment of the present invention; FIG. 2 is a front diagram of key parts of the bank note identification device; FIG. 3 is a cross-sectional view of the side of the key parts of the bank note identification device; FIG. 4 is an entire perspective view of an optical guiding member; FIG. 5 is a plan view of the optical guiding mem-

ber; and FIG. 6 is a side view of the optical guiding member.

Detailed description of the invention

[0009] This bank note identification device comprises a device body 10 including a bank note conveyance mechanism, a bank note identification sensor and a bank note housing not illustrated in the drawing and a front cover 20 provided on the upper front side of the device body.

[0010] The front cover 20 is provided with a paper currency put-in slot 21 to extend in the width direction so that a paper currency can be put in with its both sides being directed vertically at the occasion of putting a paper currency in. Allowing insertion of ends of a paper currency easily by forming the both of upper and lower sides of the paper currency put-in slot 21 respectively in a curved shape, the paper currency put-in slot 21 consists of upper and lower guides 22 and 23 making a pair for guiding a put-in paper currency to the paper currency conveyance mechanism. The guide 23 on the lower side is provided with four light emitting parts 30 for illuminating the paper currency put-in slot 21 being arranged to keep distance from each other along the paper currency put-in slot 21.

[0011] The light emitting parts 30 include four openings 31 provided in the guide 23 on the lower side to keep predetermined distance from each other in the width direction, a pair of light sources 32 in the width direction provided in the device body 10 positioned below the paper currency put-in slot 21 and a pair of optical guiding members 33 for guiding the light of the light sources 32 to the openings 31.

[0012] The respective light sources 32 such as light emitting diodes (LEDs) are provided inside the device body 10 to irradiate light anteriorly through an opening 11 provided in the device body 10.

[0013] The respective optical guiding members 33 are made of an optical material such as optical glass and are formed to connect the opening 11 provided in the device body 10 for one light source 32 to two openings 31 of the guide 23. That is, by causing the light of one light source 32 to branch and guiding the light to the two openings 31, the respective optical guiding members 33 cause the two light emitting parts 30 to emit light. The respective optical guiding members 33 have a plurality of reflective surfaces 33a for reflecting the light of the light source 32 in a predetermined direction. The respective optical guiding members 33 reflect the light of the light source 32 irradiated in a predetermined direction completely on the plurality of reflective surfaces 33a and thereby can guide the light to an arbitrary position subjected to the minimum attenuation.

[0014] For the thus configured bank note identification device, the light of a pair of the light sources 32 irradiated anteriorly from the opening 11 of the device body 10 positioned below the paper currency put-in slot 21 is incident on the respective optical guiding members 33 to reflect

on a plurality of reflective surfaces 33a as specified by dashed-dotted lines in FIG. 5 and FIG. 6 and is guided to the respective openings 31 of the guide 23 on the lower side. Thereby, the paper currency put-in slot 21 is partially irradiated by the light guided to the respective openings 31. At that time, the paper currency put-in slot 21 is partially irradiated by four light emitting parts 30 arranged to keep distance from each other in the width direction to give rise to shading between the respective light emitting parts 30. Therefore, the position of the paper currency put-in slot 21 will become easily visible by the light of the light emitting part 30 and contrast between the respective light emitting parts 30.

[0015] Thus, according to the bank note identification device of the present embodiment, the light emitting part 30 includes the openings 31 provided in the guide 23 on the lower side, the light sources 32 provided in the vicinity of the paper currency put-in slot 2 and the optical guiding members 33 guiding the light of the light source 32 to the openings 31. Thereby, the light sources 32 are not necessarily arranged on the rear side surface of the openings 31. Since the light emitting parts 30 can be arranged arbitrarily despite the positions of the light sources, degree of freedom in designing can be improved.

[0016] The optical guiding members 33 cause the light of one light source 32 to branch so as to guide the light to a plurality of openings 31. Thereby, the smaller number of light sources 32 than the number of light emitting parts 30 can cause all light emitting parts 30 to emit light and, therefore, reduction in manufacturing cost can be planned.

[0017] The optical guiding members 33 have reflective surfaces 33a for reflecting the incident light to predetermined directions. Thereby, since the light of the light sources 32 can be guided to the openings 31 subjected to the minimum attenuation, the light sources 32 with the minimum quantity of light can be used.

[0018] The optical guiding members 33 are formed of an optical glass. Thereby, the light of the light sources 32 can be guided to the openings 31 subjected to the minimum attenuation so that the light sources 32 with the minimum quantity of light can be used.

[0019] Here, the above described embodiment was described to include four light emitting sources 30 provided in the guide 23 on the lower side to keep distance from each other along the paper currency put-in slot 21. However, the number of the light emitting source 30 can be more than four and can be less than four.

[0020] The above described embodiment was described to include optical guiding members 33 to be formed so that the light of one light source 32 is caused to branch and is guided to the two openings 31. However, the optical guiding members can be formed so as to cause the light of one light source 32 to branch and guide the light to three or more openings 31.

[0021] The above described embodiment was described to include the light emitting parts 30 provided in the guide 23 on the lower side. However, the light emitting

parts 30 can be provided in the guide 22 on the upper side or can be provided in the both guides 22 and 23 on the upper and lower sides. The light emitting parts 30 can be provided on one or the both guides on the left and right sides in the case where the paper currency put-in slot 21 is provided to extend vertically.

[0022] The embodiments described in the present specification are exemplary and will not be limitative. The scope of the invention is described in the accompanying claims. All variations included in the meaning of those claims will be included in the present invention.

Claims

1. A bank note identification device comprising:

a pair of guides (22, 23) provided so as to be respectively positioned on both sides of a put-in paper currency and configuring a paper currency put-in slot (21); and
a light emitting part (30) including a plurality of openings (31) arranged to keep distance from each other in at least one of a pair of the guides (22, 23) along the paper currency put-in slot (21), a light source (32) provided in the vicinity of the paper currency put-in slot (21) and an optical guiding member (33) guiding light of the light source (32) to the openings (31).

2. The bank note identification device according to claim 1, wherein:

the optical guiding member (33) causes light of one light source (32) to branch and guides the light to a plurality of the openings (31).

3. The bank note identification device according to claim 1, wherein:

the optical guiding member (33) includes a reflective surface (33a) for reflecting light of the light source (32) in a predetermined direction.

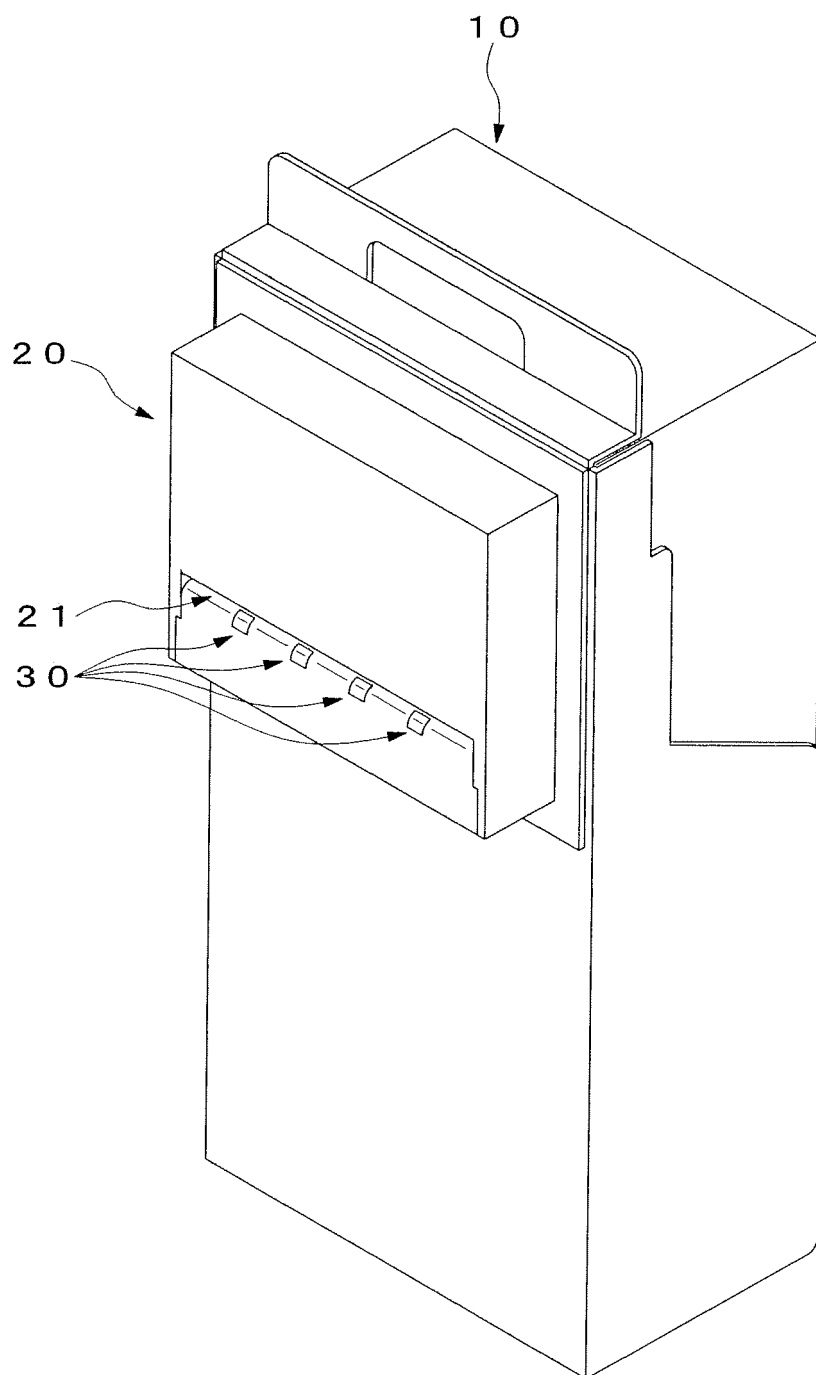
4. The bank note identification device according to claim 2, wherein:

the optical guiding member (33) includes a reflective surface (33a) for reflecting light of the light source (32) in a predetermined direction.

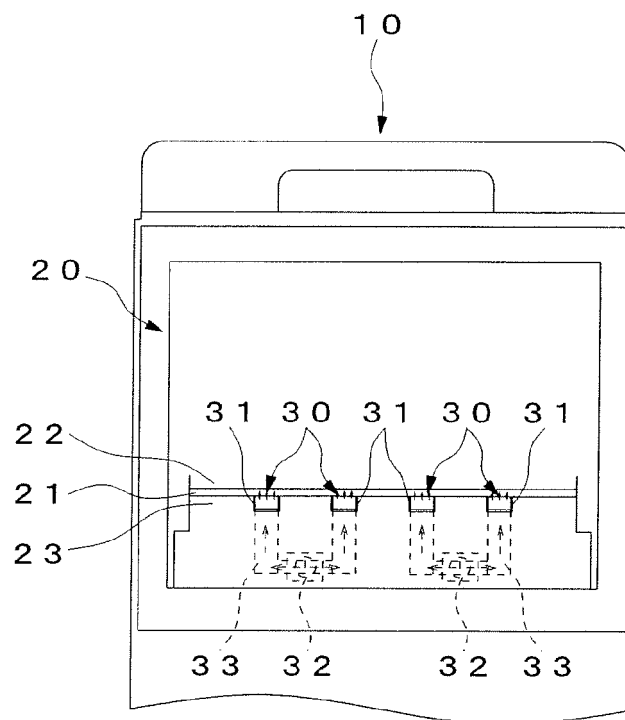
5. The bank note identification device according to any one of claims 1 to 4, wherein:

the optical guiding member (33) is made of an optical material.

F i g . 1



F i g . 2



F i g . 3

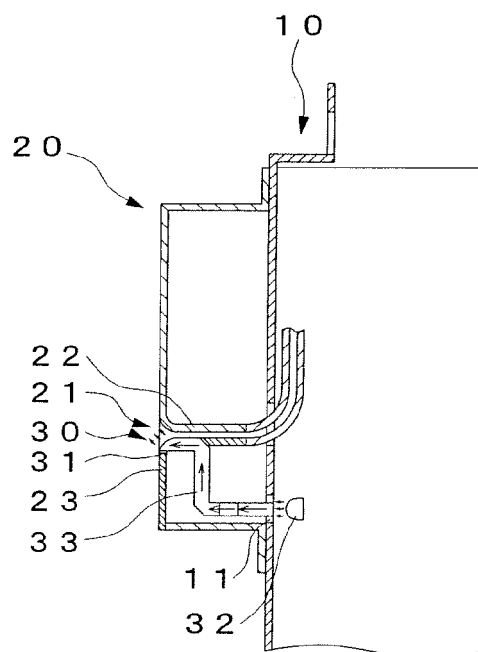


Fig. 4

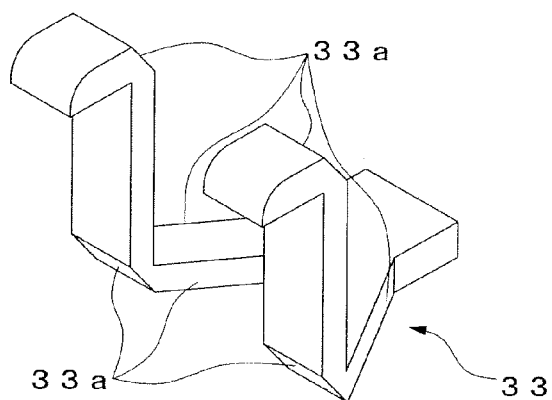


Fig. 5

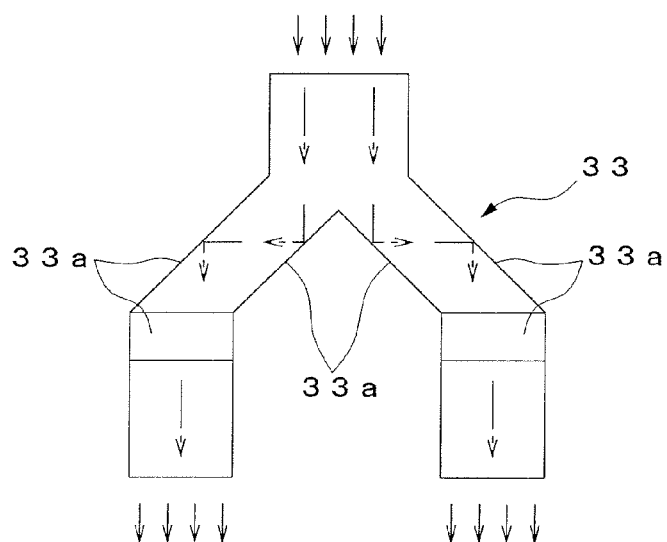


Fig. 6

