



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.12.2015 Bulletin 2015/52

(51) Int Cl.:
G08B 5/36 (2006.01) **G08B 7/06** (2006.01)
G09F 13/04 (2006.01) **G02B 26/02** (2006.01)

(21) Application number: **14173239.6**

(22) Date of filing: **20.06.2014**

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

(72) Inventor: **De Graaf, Edwin**
4906JA Oosterhout, NB (NL)

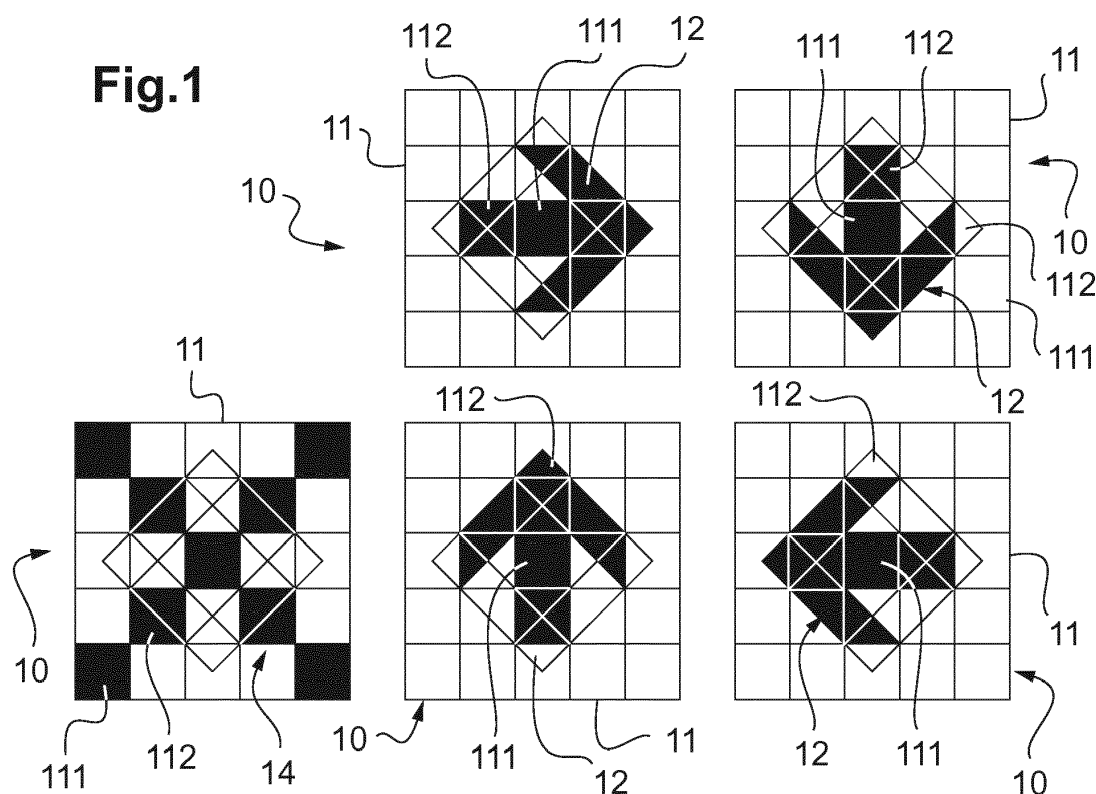
(74) Representative: **Gendron, Vincent Christian et al**
Fédit-Loriot
38, avenue Hoche
75008 Paris (FR)

(71) Applicant: **Cooper Technologies Company**
Houston, TX 77002 (US)

(54) **Dynamic exit sign**

(57) The invention concerns a dynamic exit sign (10) for displaying a route direction indication, comprising an illuminated display module for dynamically displaying an arrow in an arrow area of said illuminated display module, characterized in that said arrow area comprises an assembly (11) of adjacent surface light zones having square geometric shape (111) and triangular geometric shape (112) adapted to be activated independently in at

least one and/or the other of two safety colors comprising white and green, said adjacent surface light zones of square and triangular geometric shape (111, 112) being arranged together to form a dynamical white arrow (112) on a green background adapted to indicate different route directions depending on which surface light zones of said assembly (11) are activated and in which color.



Description

[0001] The present invention relates to lighted exit signs and emergency signs and, more particularly, to a dynamic exit sign.

[0002] Exit signs and emergency signs are widely employed in commercial and industrial buildings as well as in multi-unit residential buildings to identify exits and provide other information to persons who may be within the structure.

[0003] Route direction indication signs for movement of people usually consist of pictograms representing arrows that are fixed in a certain direction. Some such signs are continuously illuminated, others are illuminated only in the event of emergencies such as the loss of power, and still others are illuminated by the building power supply normally and by battery power when building power is lost.

[0004] For emergency safety application, such signs must comply with the related standards for properly displaying emergency escape route indication, as described in ISO 7010:2011, ISO 3864-3:2012, ISO 3864-4:2011 and EN 1838:2013. These standards define notably the shape of the pictogram providing the route direction indication, the color of the pictogram, namely the color of the arrow (white) and the color of the background (green), and the required levels for illumination of the pictogram, for the contrast between the white and green colors and for the uniformity (homogeneity) of the illumination of the pictogram.

[0005] Recently, there have been efforts to make available systems which can dynamically change the direction displayed by the sign depending on the actual situation, showing the shortest route to a safe location.

[0006] An existing solution for indicating variable route direction consists in utilizing light emitting diodes (LEDs) which are controlled to effect dynamic illumination of exit signs. Such solution involves the use of a relatively large number of spaced light emitting diodes disposed according to a pattern corresponding to the configuration of arrows oriented in multiple direction and depending on which light emitting diode of the pattern is activated, several different route direction indications can be showed.

[0007] However, an undesirable result is that the activated light emitting diodes to show a given route direction indication produce an arrow having the appearance of a multiplicity of bright spots. Accordingly, such solution is not compliant to the above standards regarding the required safety color of the sign and/or the background, and/or the required illumination, contrast and uniformity levels and/or the correct graphical representation of the arrow.

[0008] Compliant solutions are known which can include a color display screen (such as TFT) able to display a bitmap image of the arrow with the desired orientation, or include a motorized rotating arrow. However, the existing compliant solutions are complex electrically and/or mechanically and then costly.

[0009] It is an object of the present invention to provide a novel dynamic exit sign able to indicate dynamic route direction in compliancy with the standards for properly displaying emergency escape route indication, and which may be fabricated easily and economically.

[0010] The invention achieves its object thanks to a dynamic exit sign for displaying a route direction indication, comprising an illuminated display module for dynamically displaying an arrow in an arrow area of said illuminated display module, characterized in that said arrow area comprises an assembly of adjacent surface light zones having square geometric shape and triangular geometric shape adapted to be activated independently in at least one and/or the other of two safety colors comprising white and green, said adjacent surface light zones of square and triangular geometric shape being arranged together to form a dynamical white arrow on a green background adapted to indicate different route directions depending on which surface light zones of said assembly are activated and in which color.

[0011] Thanks to this arrangement, the dynamic exit sign according to the invention can be made compliant to the standards mentioned above. Indeed, via the approach of dividing the arrow area in adjacent surface light zones of square shapes and triangular shapes, which can be switched on and off independently in the safety colors required, the illuminated display module is capable of showing a dynamical arrow with several different directions by complying with the exit sign layout requirements both in terms of global geometric shape and in terms of safety colors (green) and contrast color to the safety color (white), contrarily to the known solutions where the arrow is constructed out of individual dots (LEDs).

[0012] Advantageously, said dynamical white arrow is adapted to indicate the four cardinal directions.

[0013] According to a preferred embodiment, said assembly of adjacent surface light zones comprises a printed circuit board of square global geometrical shape, a plurality of spacers projecting from said printed circuit board and forming a matrix of square and triangular compartments, at least one punctual light source being fitted on said printed circuit board respectively in each of said square and triangular compartments, so that the light emitted by said punctual light source can at least partially pass through a semi-transparent projection layer disposed on the viewing side of each of said square and triangular compartments.

[0014] Preferably, an additional layer of reflective and/or diffusing material is arranged at the surfaces inside each of said square and triangular compartments in order to optimize the illumination of the viewing side of each of said square and triangular compartments.

[0015] According to a particular embodiment, said illuminated display module comprises two said matrix of square and triangular compartments adapted to be stacked together with a diffusing layer in between on said printed circuit board, said semi-transparent projection

layer being disposed on top of the stacking.

[0016] Advantageously, said punctual light sources comprise variously colored light emitting diodes (LEDs) or possibly RGB LEDs.

[0017] Other features and advantages of the invention will emerge from the following description of one embodiment. The appended drawings are referred to, in which:

Figure 1 is a schematic view of the assembly of adjacent surface light zones of particular shapes constituting the compliant lighted exit sign according to the invention, in front view and in different configurations of activation of the adjacent surface light zones showing several different indications of direction ;

Figure 2 is a schematic side view of the assembly in accordance with the invention in the assembled state.

Figure 3 is a perspective view of the matrix of compartments used in the assembly in the non-assembled state.

[0018] Referring to Figure 1, the sign 10 according to the invention dedicated to dynamically display a directional arrow 12 comprises an assembly 11 of adjacent surface light zones, respectively surface light zones 111 of square geometric shape and surface light zones 112 of triangular geometric shape, forming together a display matrix of the arrow area having a global square shape. Each of the surface light zones can be activated independently in one and/or another of the safety colors requested by the standards on emergency escape route indications, namely green and white. The arrow area of the sign 10 of global square shape is then divided into a plurality of square and triangular elementary shapes, namely the plurality of surface light zones 111 of square geometric shape and surface light zones 112 of triangular geometric shape, which are disposed together so that they can display the drawing of an arrow according a compliant, conventional fixed (non dynamic) emergency escape route sign, depending on which surface light zones of the assembly 11 are activated, and in which color. As illustrated in figure 1, the dynamical white arrow 12 displayed by the sign 10 according to the invention is able to indicate the four cardinal directions on a green background by appropriately controlling the independent activation of the plurality of adjacent surface light zones dividing the arrow area and the color thereof (white or green) according to whether the controlled surface light zone enter in the formation of the white arrow or the green background.

[0019] Then by using this particular assembly 11 of surface light zones of square and triangular shape allowing to divide the arrow area in squares and triangles, it gives the opportunity to have a dynamic sign which is compliant to the ISO and EN standards on emergency escape route indications (ISO 7010:2011, ISO 3864-3:2012, ISO 3864-4:2011 and EN 1838:2013).

[0020] Additionally, as also illustrated in figure 1, the particular assembly 11 of surface light zones of square and triangular shape is also adapted to display a prohibition sign, for instance a red cross 14, by switching on in red color the surface light zones of the assembly 11 disposed along the diagonals of the global square shape of the arrow area and by switching off the others.

[0021] Figures 2 and 3 shows a practical embodiment for implementing the assembly 11 of surface light zones of Figure 1 enabling to display a compliant dynamic sign. According to the side view of the assembly 11, the latter comprises a printed circuit board 13 of square global geometrical shape and a plurality of spacers 15 projecting from the printed circuit board 13, for instance with a total height of 10 mm to 40 mm, and forming a matrix 16 of square and triangular compartments as illustrated in figure 3. Said matrix 16 of compartments can be molded in one piece from a plastic material and presents a square global shape complementary of the shape of the printed circuit board 13 on which it is dedicated to be mounted. According to the embodiment of figure 3, the spacers 15 are then adapted to form a matrix of 5 x 5 square compartments 17 of for instance 15x15 mm to 60x60 mm, some of which being divided in two or four triangular compartments 18 by the spacers 15.

[0022] More precisely, the central square compartment of the matrix 16 of compartments is bordered on each of its sides with a square compartment divided in four triangular compartments by spacers extending along of its diagonals, and the square compartments adjacent to the central square compartment only by their respective corner are each divided in two triangular compartments by a spacer extending along their diagonal opposite to the corner adjacent to the central square compartment. Furthermore, a triangular compartment is formed in each square compartment opposite to the central square compartment in view of each the square compartment divided in four triangular compartment by spacers extending along half the diagonal from each corner adjacent to the square compartment divided in four triangular compartment.

[0023] In each square compartment and triangular compartment of the matrix 16 of compartments mounted on the printed circuit board 13, one or more variously colored Light Emitting Diodes (LEDs) 19, possibly RGB LEDs, are fitted, which can be switched on and off independently in at least one of the colors white, red and green. In a variant, all LEDs are switched in groups of 2 to more than 10 LEDs. For instance all red LEDs are switched on and off together.

[0024] Furthermore, a semi-transparent projection layer 20 is mounted on top of the matrix 16 of compartments to cover it so that the light emitted by the LEDs 19 mounted on the printed circuit board 13 in each of the square and triangular compartments of the matrix pass through the semi-transparent projection layer 19 on the viewing side of the sign. Thus, on the viewing side of the exit sign, each compartment of the matrix of compartment thus il-

luminated forms a corresponding surface light zone of the exit sign.

[0025] Advantageously, an additional layer of reflective and/or diffusing material is arranged at the surfaces inside each of square and triangular compartments in order to optimize the illumination of the viewing side of each compartment.

[0026] According to a particular embodiment, the sign comprises two stacked matrix of compartments with a diffusing layer in between and the semi-transparent projection layer is disposed on top of the stacking. This embodiment allows to improve the uniformity of illumination of the viewing side across the stacked compartments with the diffusion layer in between.

[0027] Compliancy with the related standards of the indication of dynamic route directions by means of the assembly according to the invention is brought about by an appropriate control of the illumination color and illumination level (brightness) of each illuminated compartment of the matrix of square and triangular compartments used for displaying the dynamical arrow. Then, according to the invention, a dynamic sign can be displayed with colors, illuminations levels, uniformity of illumination and contrast can be all made compliant with the requirements of the related standards.

Claims

1. Dynamic exit sign (10) for displaying a route direction indication, comprising an illuminated display module for dynamically displaying an arrow in an arrow area of said illuminated display module, **characterized in that** said arrow area comprises an assembly (11) of adjacent surface light zones having square geometric shape (111) and triangular geometric shape (112) adapted to be activated independently in at least one and/or the other of two safety colors comprising white and green, said adjacent surface light zones of square and triangular geometric shape (111, 112) being arranged together to form a dynamical white arrow (112) on a green background adapted to indicate different route directions depending on which surface light zones of said assembly (11) are activated and in which color.
2. Dynamic exit sign according to claim 1, **characterized in that** said dynamical white arrow (112) is adapted to indicate the four cardinal directions.
3. Dynamic exit sign according to any one of claims 1 to 2, **characterized in that** said assembly (11) of adjacent surface light zones (111, 112) comprises a printed circuit board (13) of square global geometrical shape, a plurality of spacers (15) projecting from said printed circuit board (13) and forming a matrix (16) of square and triangular compartments (17, 18), at least one punctual light source (19) being fitted on

said printed circuit board (13) respectively in each of said square and triangular compartments (17, 18), so that the light emitted by said punctual light source (19) can at least partially pass through a semi-transparent projection layer (20) disposed on the viewing side of each of said square and triangular compartments (17, 18).

4. Dynamic exit sign according to claim 3, **characterized in that** an additional layer of reflective and/or diffusing material is arranged at the surfaces inside each of said square and triangular compartments (17, 18) of the matrix (16) of compartments in order to optimize the illumination of the viewing side of each of said square and triangular compartments (17, 18).
5. Dynamic exit sign according to any one of claim 2 to 4, **characterized in that** said illuminated display module comprises two said matrix of square and triangular compartments adapted to be stacked together with a diffusing layer in between on said printed circuit board (13), said semi-transparent projection layer (20) being disposed on top of the stacking.
6. Dynamic exit sign according to any one of claims 2 to 5, **characterized in that** said punctual light sources (20) comprise variously colored light emitting diodes.

Fig.1

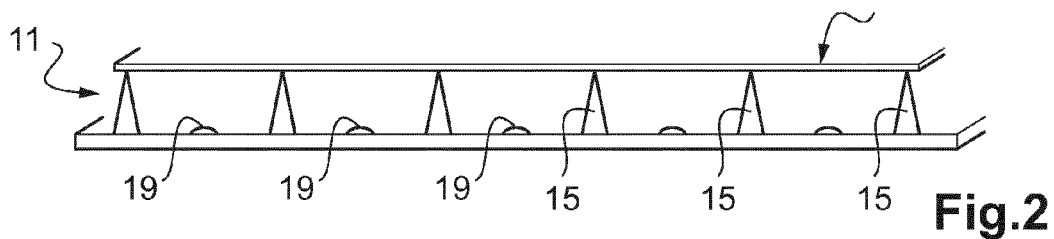
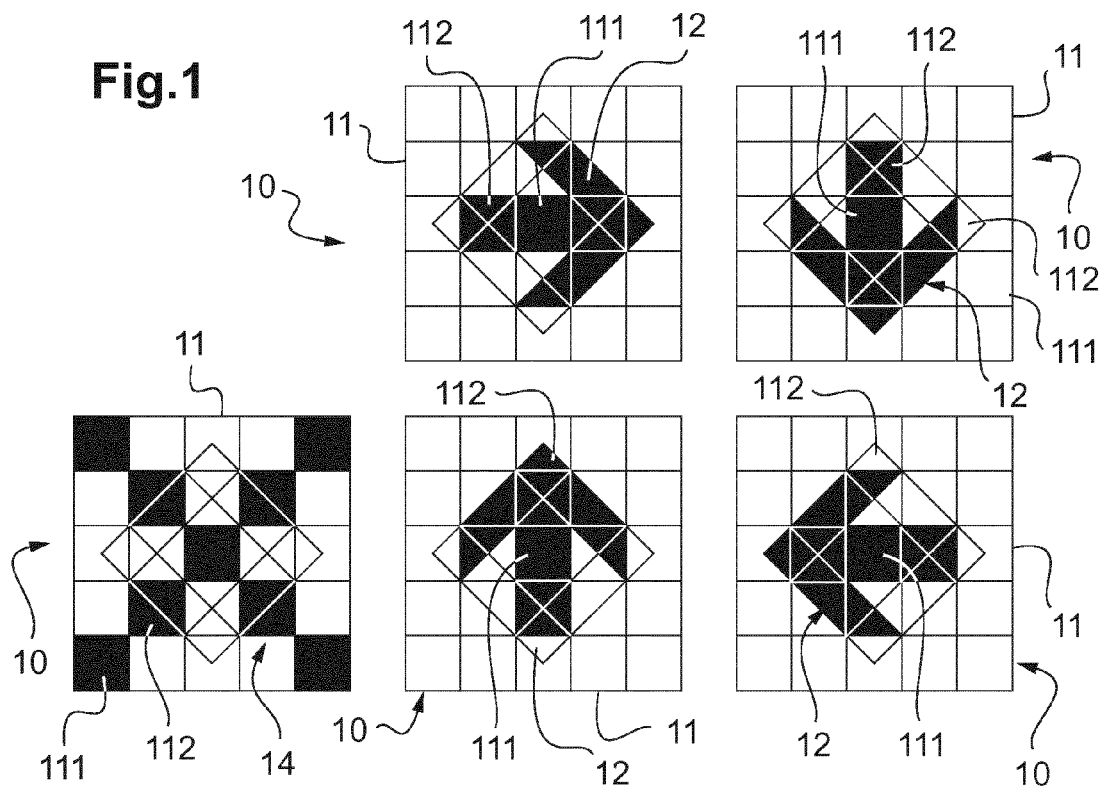
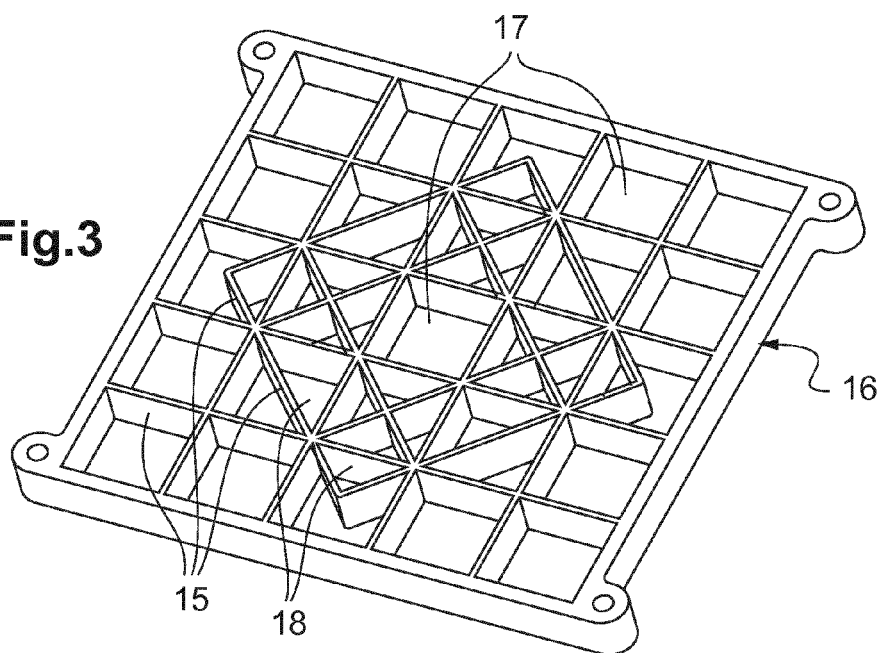


Fig.2

Fig.3





EUROPEAN SEARCH REPORT

Application Number
EP 14 17 3239

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2008 129094 A (OTIS ELEVATOR JAPAN) 5 June 2008 (2008-06-05) * paragraph [0032] - paragraph [0040]; figure 1 *	1-6	INV. G08B5/36 G08B7/06 G09F13/04 G02B26/02
X	WO 01/50444 A1 (KONINKL PHILIPS ELECTRONICS NV [NL]) 12 July 2001 (2001-07-12) * figures 3,4 *	1-6	
Y	JP 2013 242689 A (HOCHIKI CO) 5 December 2013 (2013-12-05) * figures 3c,4 * * abstract *	1-6	
Y	US 2009/003002 A1 (SATO EIICHI [JP]) 1 January 2009 (2009-01-01) * figures 14c,25b *	1-6	
A	JP 2014 010445 A (YAMAGUCHI TAKAHISA) 20 January 2014 (2014-01-20) * figures 53,55 *	1-6	TECHNICAL FIELDS SEARCHED (IPC) G08B G09F G02B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 8 December 2014	Examiner Malagoli, M
CATEGORY OF CITED DOCUMENTS 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 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			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 17 3239

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-12-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2008129094 A	05-06-2008	NONE	
WO 0150444 A1	12-07-2001	CN 1350683 A DE 60030541 T2 JP 4741142 B2 JP 2003519810 A US 2001049893 A1 US 2003046842 A1 WO 0150444 A1	22-05-2002 30-08-2007 03-08-2011 24-06-2003 13-12-2001 13-03-2003 12-07-2001
JP 2013242689 A	05-12-2013	NONE	
US 2009003002 A1	01-01-2009	CN 101375095 A JP 4280283 B2 JP 2008027886 A KR 20080099281 A KR 20090061682 A TW 1320838 B TW 200946819 A US 2009003002 A1 US 2010061096 A1 WO 2007086347 A1	25-02-2009 17-06-2009 07-02-2008 12-11-2008 16-06-2009 21-02-2010 16-11-2009 01-01-2009 11-03-2010 02-08-2007
JP 2014010445 A	20-01-2014	JP 2014010445 A WO 2014132460 A1	20-01-2014 04-09-2014

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82