(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 990 196 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
07.12.2005 Bulletin 2005/49

(21) Application number: **97929214.1**

(22) Date of filing: **18.06.1997**

(51) Int Cl.[7]: **G04B 19/34**

(86) International application number:
PCT/EP1997/003182

(87) International publication number:
WO 1998/058298 (23.12.1998 Gazette 1998/51)

(54) **PROJECTION CLOCK**

PROJEKTIONSUHR

HORLOGE A DISPOSITIF DE PROJECTION

(84) Designated Contracting States:
DE FR GB IT

(43) Date of publication of application:
05.04.2000 Bulletin 2000/14

(73) Proprietor: **IDT-LCD Holdings (BVI) Limited**
Tortola, British Virgin Islands (VG)

(72) Inventor: **CHAN, Raymond Apartment E10**
Hong Kong (CN)

(74) Representative: **Lusuardi, Werther Giovanni**
Dr. Lusuardi AG,
Kreuzbühlstrasse 8
8008 Zürich (CH)

(56) References cited:
EP-A- 0 036 946
EP-A- 0 180 155
EP-A- 0 382 130
EP-A- 5 105 396
WO-A-92/18914
FR-A- 1 605 562
FR-A- 2 633 070
GB-A- 440 444
US-A- 5 260 919

Remarks:

The file contains technical information submitted after the application was filed and not included in this specification

EP 0 990 196 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to a clock with an apparatus for projection of a liquid crystal display to a smooth surface according to the preamble of claim 1.

[0002] A clock with an apparatus for projection of a display to a ceiling or a wall as defined in the preamble of claim 1 is already known from the EP-A 0 036 946 KNOX. The projection device of this known apparatus comprises sequentially a light source, a focussing lens, a liquid crystal display and a projection lens. Furthermore, the projection device is pivotably attached at the casing of the clock.

[0003] A further clock with an apparatus for projection of a display is known from the FR 2 633 070 RIGAL. Here, a light source, a partially translucent clockface and a system of lenses are sequentially arranged within the projection device.

[0004] Another projection clock is known from the FR 1 605 562 BATRIAUD. The projection of the clockface or numerals is based on the transmitted light principle or on reflected light. Also the apparatus contains a lens or a system of lenses.

[0005] The disadvantages of former similar dispositions are principally reasoned therein that the use of incandescent bulbs only permits a short lastingness in case of continuous duty and so far no projection clock coupled with a radio clock is available.

[0006] Hereto, the invention seeks to offer remedy. The purpose of the invention is to project the display of a clock comprising a projection device to any smooth surface. Therefore, the projection clock provides a moveable projection device. Furthermore, the projection clock may provide a time display based on a clock synchronized by a DCF-77 signal - a so called radio clock - and may provide an alarm. Preferably, the projection device is focusable and permits a focusing of the projected image to walls having a different distance or to ceilings having a diverse height. Thus, different setup heights of the projection clock may be compensated by adjusting the lens. The use of a super bright light-emitting diode with collimator-cage as projection light source also causes a significant increase of the lastingness of the projection light source compared to the former applied incandescent bulbs with halogen filling.

[0007] The invention solves the posed task by using a clock which embodies the features of claim 1.

[0008] An other advantageous preferable embodiment of the invention is the translatability of the projecting lens in an axial direction by means of a knurled turning knob. Therewith the projecting lens is easily focusable and permits a focusing of the projected image at walls or ceilings.

[0009] The advantages of a preferable embodiment of the invention are particularly based on the focusability of the lens through which the projection clock may be placed on an arbitrary level and may be used with different heights of a ceiling. Furthermore, a clock according to a preferable embodiment of the invention permits the projection of a clock coupled with a radio clock at a wall or a ceiling.

[0010] Additional features and advantages of the invention will be discussed in the detailed description with accompanying drawings.

Brief description of the drawings:

[0011]

Fig. 1 shows a top view of the projection clock according to one implementation of the invention;

Fig. 2 illustrates a front view of the projection clock according to one implementation of the invention.

[0012] Fig. 1 illustrates the projection clock comprising a clock 1 and a projection device 2. The projection device 2 is based on the transmitted light principle and comprises a light source 4, a miniature liquid crystal display 5 which is to be projected and a spherical lens 3. The light source 4, the miniature liquid crystal display 5 and the spherical lens 3 are sequentially arranged along the light beam permitting a projection of the miniature liquid crystal display 5 into a real image. Moreover, the projection device 2 is moveable mounted and provided with a knurled turning knob 8 permitting a focussing of the spherical lens 3. The clock 1 and the projection device are provided with two batteries 12, but optionally an AC-power unit 13 with a 3 V DC low tension side may be connected.

[0013] Fig. 2 shows a front view which illustrates the clock 1 with the projection device 2 which is moveable relative to the casing 9 of the clock 1 around the axis of rotation 17 which connects the casing 9 and the clock 1. The knurled turning knob 8 at the projection device 2 serves to translate the lens 3 in an axial direction and therewith focus the spherical lens 3. The display 11 of the clock 1 selectively provides a 24 h or a 12 h time display which may be chosen by a press switch 14. Apart from this a display 15 of the week-day and a display 16 of the date is integrated in the display 11 of the clock 9. Moreover, an alarm function, preferably providing an acoustical signal can be controlled by the press switch 14 which is integrated in the clock 1.

Claims

1. Clock (1) with an apparatus for projection of a liquid crystal display (5) to a smooth surface, whereby the clock (1) comprises a casing (9), having a display (11), and a projection device (2), said projection device (2) being moveably connected to the casing (9) of the clock (1) and comprising a light source (4), a liquid crystal display (5) and a lens (3), whereby the projection device (2) is based on the transmitted

light principle, where the light source (4), the liquid crystal display (5) which is to be projected and the lens (3) are sequentially arranged along the light beam permitting the projection of a real image, **characterised in that**

A) the display (11) of the clock (1) selectively shows a 24-hour reading or a 12-hour reading; and
B) a light-emitting diode is used as said light source (4).

2. Clock (1) according to claim 1, **characterised in that** the lens (3) is translatable in the axial direction, preferably by means of a knurled turning knob (8), such to focus the projected image.

3. Clock (1) according to claim 1 or 2, **characterised in that** it is configured as a radio controlled clock.

4. Clock (1) according to claim 3, **characterised in that** the dock (1) is synchronized on the basis of a DCF-77-signal.

5. Clock (1) according to one of the claims 1 to 4, **characterised in that** the clock (1) is provided with two batteries (12), preferably of the size UM3 or "AA".

6. Clock (1) according to one of the claims 1 to 5, **characterised in that** the clock (1) provides an alarm signal (10), preferably an acoustical signal.

7. Clock (1) according to one of the claims 1 to 6, **characterised in that** the lens (3) is adjustable such to focus the projected image.

8. Clock (1) according to one of the claims 1 to 7, **characterised in that** the lens (3) is spherical ;

9. Clock (1) according to one of the claims 1 to 8, **characterised in that** a AC-power unit (13) is connectable to the clock (1) and the projection device (2);

10. Clock (1) according to one of the claims 1 to 3, **characterised in that** said AC-power unit (13) is provided with a 3 V DC low tension side.

11. Clock (1) according to one of the claims 1 to 10, **characterised in that** the projection device (2) is turnable relative to the casing (9) of the clock (1) by rotating it around the axis of rotation (17) which connects the clock (1) and the projection device (2).

Patentansprüche

1. Uhr (1) mit einer Vorrichtung zur Projektion einer Flüssigkristallanzeige (5) an eine glatte Oberfläche, wobei die Uhr (1) ein Gehäuse (9) mit einer Anzeige (11) und eine Projektionsvorrichtung (2) umfasst, wobei die Projektionsvorrichtung (2) bewegbar mit dem Gehäuse (9) der Uhr (1) verbunden ist und eine Lichtquelle (4), eine Flüssigkristallanzeige und eine Linse (3) umfasst, wobei die Projektionsvorrichtung (2) auf dem Durchlichtprinzip basiert, wo die Lichtquelle (4), die zu projizierende Flüssigkristallanzeige (5) und die Linse (3) hintereinander entlang des Lichtstrahls angeordnet sind und die Projektion eines realen Bildes gestatten,
dadurch gekennzeichnet, dass

A) die Anzeige (11) der Uhr (1) selektiv eine 24-Stunden oder eine 12-Stunden Ablesung anzeigt; und
B) die Lichtquelle (4) durch eine lichtemittierende Diode realisiert wird.

2. Uhr (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Linse (3) in der axialen Richtung verschiebbar ist, vorzugsweise mittels eines geränderten Drehknopfes (8) um das projizierte Bild zu fokussieren.

3. Uhr (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** sie als radiowellenkontrollierte Uhr ausgebildet ist.

4. Uhr (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** die Uhr (1) auf der Basis eines DCF-77-Signals synchronisiert wird.

5. Uhr (1) nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Uhr (1) mit zwei Batterien (12) ausgestattet ist, vorzugsweise vom Typ UM3 oder "AA".

6. Uhr (1) nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Uhr (1) mit einem Alarmsignal (10) ausgestattet ist, vorzugsweise mit einem akustischen Signal.

7. Uhr (1) nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** die Linse (3) justierbar ist, um das projizierte Bild zu fokussieren.

8. Uhr (1) nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** die Linse (3) sphärisch ist.

9. Uhr (1) nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** ein Wechselstromversorgungsgerät (13) an die Uhr (1) und die Projektionsvorrichtung (2) anschliessbar ist.

10. Uhr (1) nach einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet, dass** das Wechselstromversorgungsgerät (13) mit einer 3 Volt Gleichspan-

nungs-Niederspannungsseite ausgestattet ist.

11. Uhr (1) nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** die Projektionsvorrichtung (2) durch rotieren um eine Drehachse (17), welche die Uhr (1) und die Projektionsvorrichtung (2) verbindet, relativ zum Gehäuse (9) der Uhr (1) drehbar ist.

Revendications

1. Horloge (1) dotée d'un dispositif de projection pour un affichage à cristaux liquides (5) sur une surface lisse, où l'horloge (1) comprend un boîtier (9) possédant un afficheur (11) et un dispositif de projection (2), ledit dispositif de projection (2) pouvant être déplacé en étant connecté au boîtier (9) de l'horloge (1) et comprenant une source de lumière (4), un affichage à cristaux liquides (5) et une lentille (3), dans laquelle le dispositif de projection (2) est basé sur le principe de transmission de la lumière, où la source de lumière (4), l'affichage à cristaux liquides (5) qui doit être projeté et la lentille (3) sont disposés successivement le long du faisceau lumineux permettant la projection d'une image réelle,
caractérisée en ce que :

A) l'afficheur (11) de l'horloge (1) présente sélectivement une lecture de 24 heures ou une lecture de 12 heures ; et
B) une diode électroluminescente est utilisée comme dite source de lumière (4).

2. Horloge (1) selon la revendication 1, **caractérisée en ce que** la lentille (3) peut être translatée dans la direction axiale, de préférence au moyen d'un bouton de réglage à molette (8), de façon à focaliser l'image projetée.

3. Horloge (1) selon la revendication 1 ou 2, **caractérisée en ce qu'**elle est configurée comme une horloge commandée à distance par radio.

4. Horloge (1) selon la revendication 3, **caractérisée en ce que** l'horloge (1) est synchronisée sur la base d'un signal DCF-77.

5. Horloge (1) selon l'une quelconque des revendications 1 à 4, **caractérisée en ce que** l'horloge (1) est pourvue de deux batteries (12), de préférence, de la dimension UM3 ou "AA".

6. Horloge (1) selon l'une quelconque des revendications 1 à 5, **caractérisée en ce que** l'horloge (1) fournit un signal d'alarme (10), de préférence un signal sonore.

7. Horloge (1) selon l'une des revendications 1 à 6, **caractérisée en ce que** la lentille (3) est réglable de façon à pouvoir focaliser l'image projetée.

8. Horloge (1) selon l'une des revendications 1 à 7, **caractérisée en ce que** la lentille (3) est sphérique.

9. Horloge (1) selon l'une des revendications 1 à 8, **caractérisée en ce qu'**un bloc d'alimentation électrique en courant alternatif (13) peut être connecté à l'horloge (1) et au dispositif de projection (2).

10. Horloge (1) selon l'une des revendications 1 à 9, **caractérisée en ce que** ledit bloc d'alimentation électrique en courant alternatif (13) est pourvue d'un côté de basse tension continue de 3 V.

11. Horloge selon l'une des revendications 1 à 10, **caractérisée en ce que** le dispositif de projection (2) peut être tourné par rapport au boîtier (9) de l'horloge (1) en le faisant tourner autour de l'axe de rotation (17) qui raccorde l'horloge (1) et le dispositif de projection (2).

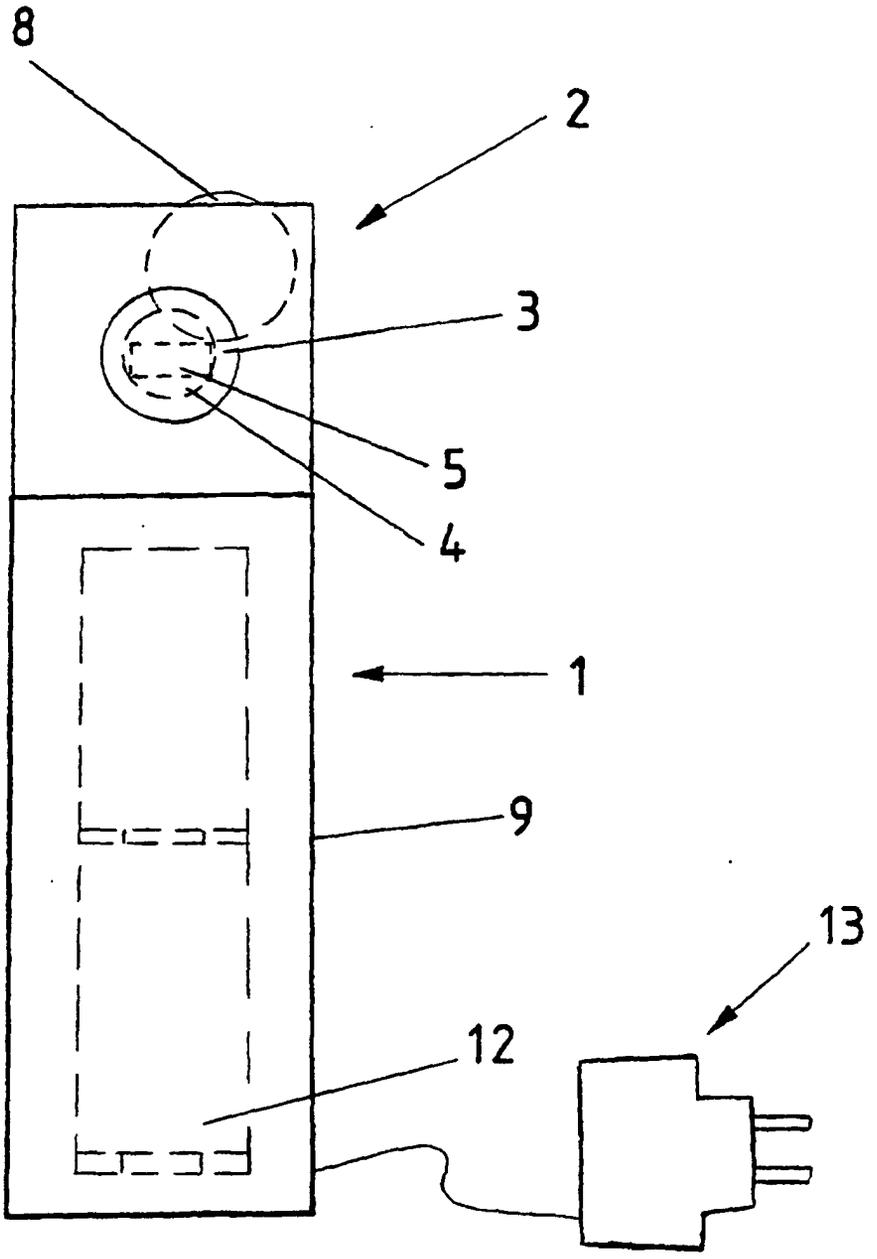

Fig.1

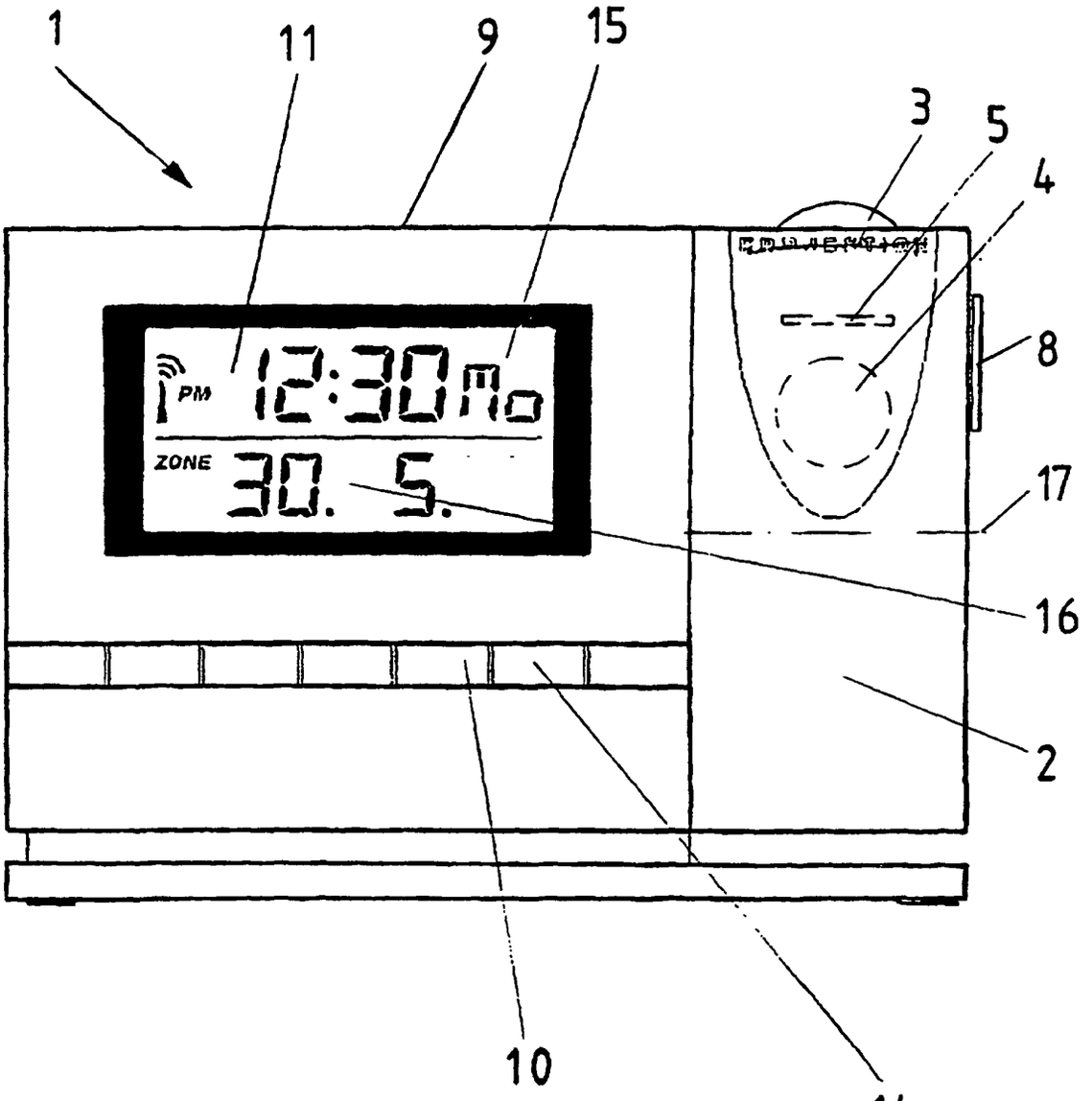

Fig. 2