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(54) Title: VERTICAL PLOTTER

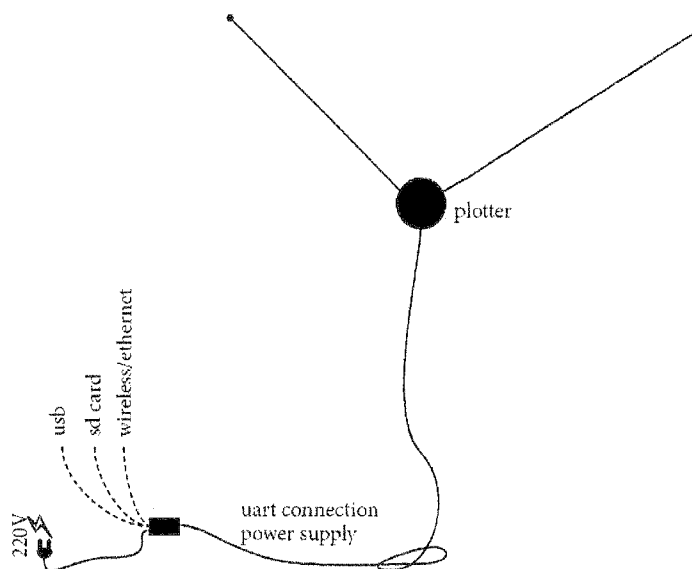


Fig. 1

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## VERTICAL PLOTTER

### BACKGROUND OF THE INVENTION

The proposed invention is in the technical field of  
5 plotters.

More specifically, the present invention is in the  
technical field of vertical plotters.

More specifically, the present invention is in the  
technical field of vertical plotters for a wall  
10 application.

### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a functional diagram of the proposed invention:  
the printing head is suspended by two cables (belts) and  
connected to a power supply;

15 Fig. 2 is a perspective view of the printing head showing  
its main components;

Fig. 3 is a section of the printing head showing its main  
components.

### SUMMARY OF THE INVENTION

20 The proposed invention is a vertical plotter: a system that  
allows printing vector graphics on a vertical planar  
surface using gravity and two independent motors 7 mounted  
within the printing head as actuators.

The plotter is suspended by the two cables (or belts) 1  
25 fixed at the two top extremities of the wall on one end and

connected to the at least two independent motors 7 at the other end through a reduction gear 6. In particular, each reduction gear 6 is attached to a respective cable 1 by a reel 13.

5 Each motor 7, i.e. electric motor, rolling up or unrolling cable 1 or a synchronous belt, allows the planar movement of the plotter on a vertical surface or a wall.

The invention can be applied to any vertical planar surface just fixing the two top extremities of the two cables 1 at  
10 the same high and at a given distance on the wall. Gravity will ensure proper tension on cables 1 or belts.

A further actuator 2 within the vertical plotter allows moving a writing nib in and out through a servo-motor 4, putting it in contact with the surface, in order to draw or  
15 discontinue a drawing line.

Main features of the object are:

- All mechanics and motors, in addition to the writing system, are mounted on the printing head; this allows  
20 the object to be very easily installed, used and maintained.

Furthermore all the electronics is integrated within the print head: a power connection must be provided for an external electrical power source having a  
25 transformer.

- Preferably data are exchanged through Wi-Fi or another wireless technology: this means that, given a Wi-Fi connection, the vertical plotter can work autonomously receiving input from a remote device, such as a smartphone or a PC (Internet connection must be provided); data can also be communicated through a USB cable and read by an SD flash memory card (an USB socket will be also integrated into the printing head in order to allow an easy plug-and-play of the vertical plotter to a computer);

- Preferably an erasing system - a rotating mechanism finished with Velcro 5 - can erase what was previously drawn. The planar vertical surface should be finished with a dry erase whiteboard or glass. This allows the user to write, erase and re-write contents on the planar vertical surface. Preferably, the nib or a carrier for a writing element is actuated by the same actuator 4 which controls the erasing system 5 so that when the erasing system 5 operates the writing element is inhibited, i.e. is kept distanced from the writing surface, and vice-versa. This can be obtained by a sprocket 9 acting on two opposed racks 10 (see figure 3).

- Preferably detect limit switch sensors 3 located on the printing head allow the vertical plotter to understand its actual position on the vertical surface. This permits the plotter to start operating without the need to manually position the printing head on a specific point on the wall; this is necessary to the system to properly elaborate the coordinates needed to move freely on the wall.

10

As shown in figure 1, racks 10 are respectively connected to the carrier for the writing device and the a support 11 for the Velcro-finished element of the erasing device.

Racks 10 are guided by linear slides 12 (figure 1).

- 15 Furthermore, printing head comprises contact projections 8 to rest on the writing surface while either erasing device 5 or the nib contacts the writing surface.

#### WORKFLOW

- 20 The workflow first thing foresees the generation of a series of polar coordinates necessary to draw the desired graphics on the vertical surface starting from Cartesian coordinates. All these coordinates are generated via software (i.e. Processing) starting from a vector/raster graphic image and/or a string of text provided by the user
- 25 through a dedicated interface on a computer.

These coordinates are subsequently sent to a microcontroller (i.e. Arduino) installed within the printing head. The microcontroller elaborates the interpolations necessary to for the printing head to reach  
5 its proper position on the wall, point after point.

The microcontroller indeed activates motors 7 that, allowing reels 13 to rotate, rolling up or unrolling cables 1 (or the belts), let the printing head to move freely on the vertical surface; in addition to this, the  
10 microcontroller activates the writing/erasing systems previously described.

Preferably, a series of state LEDs allow the printing head to display its status, i.e. calibrating, moving, writing, erasing, to the user.

## CLAIMS

1. A vertical plotter comprising a printing head, two motorized reels carried by the printing head, flexible elements attached to the respective motorized reel and suitable to be attached to a support so that the printing head can move and print on a substantially vertical surface, and an erasing device carried by the printing head.

10

2. A vertical plotter according to claim 1, characterized by comprising a carrier for a writing element and a servo-motor controlling both the erasing device and the carrier so that when the erasing device operates the writing element is inhibited.

15

3. A vertical plotter according to claim 2, characterized in that the servo-motor is configured to keep the erasing device away from the writing surface when the carrier is operating.

20

4. A vertical plotter according to claim 3, characterized in that the servo-motor is a rotary motor and by comprising a sprocket and a first and a second rack meshing with the sprocket, the sprocket being attached to the servo-motor,

25

the first rack being attached to carrier and the second rack being attached to the erasing device.

5. A vertical plotter according to any of the preceding  
5 claims, characterized by comprising sensors cooperating with the flexible elements to detect the actual position of the printing head on the writing surface.

6. A vertical plotter according to any of the preceding  
10 claims, characterized in that the erasing device is a rotating device.

7. A vertical plotter according to any of the preceding  
claims, characterized in that the entire control  
15 electronics is integrated and on-board the printing head.

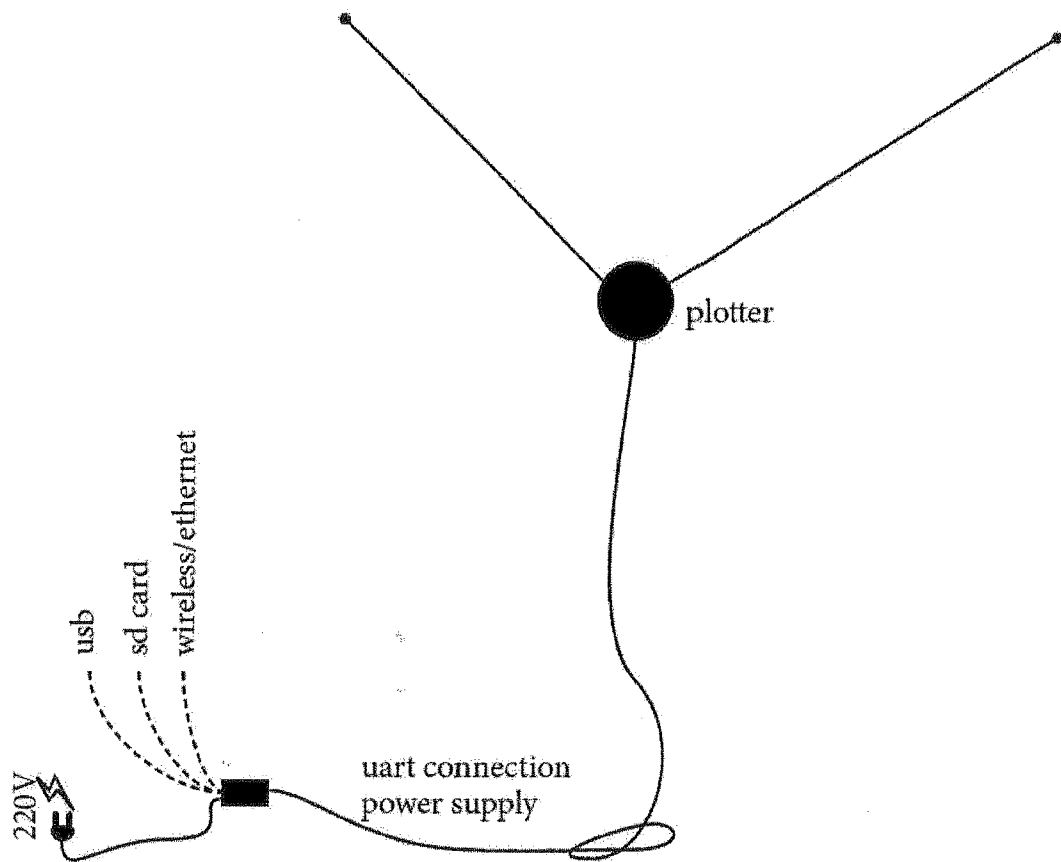


Fig. 1

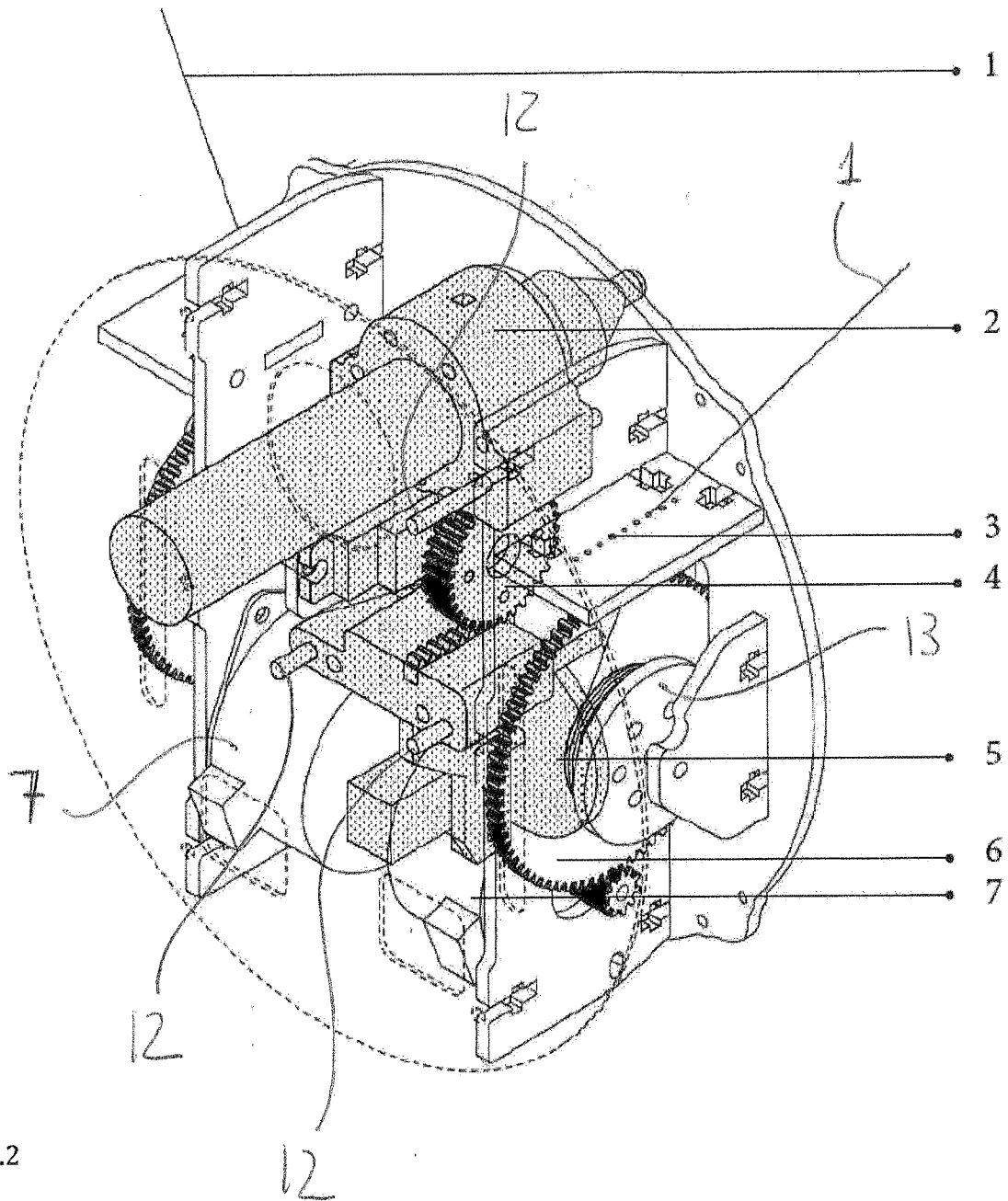


Fig.2

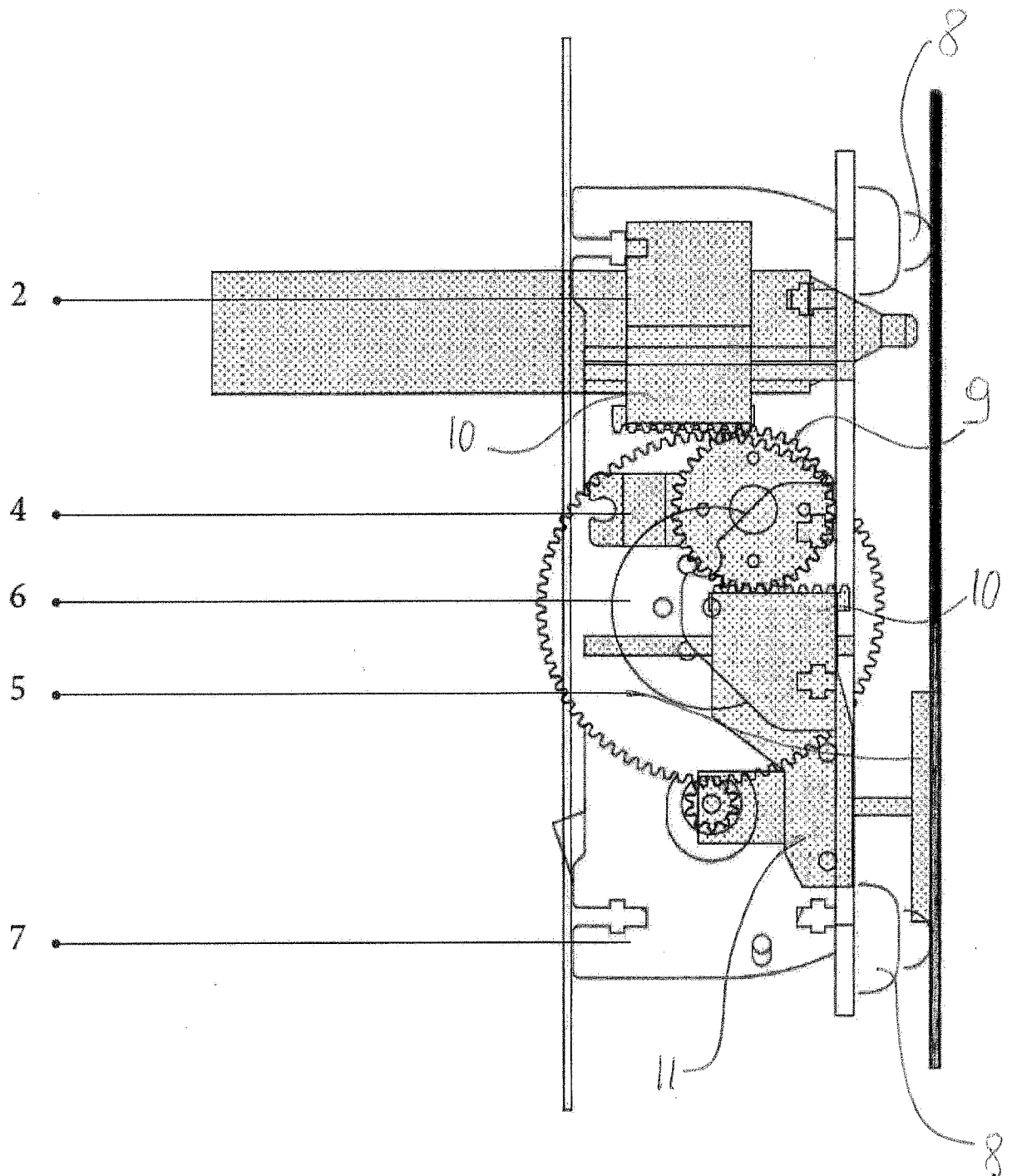


Fig.3

# INTERNATIONAL SEARCH REPORT

International application No

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## A. CLASSIFICATION OF SUBJECT MATTER

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ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	----- US 6 368 002 B1 (SAUND ERIC [US] ET AL) 9 April 2002 (2002-04-09) column 3, line 12 - column 5, line 50	1,5
A	----- DE 10 2007 022968 B3 (IPRM INTELLECTUAL PROPERTY RIG [CH]) 29 January 2009 (2009-01-29) paragraph [0058] ----- -/-	1-7



Further documents are listed in the continuation of Box C.



See patent family annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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# INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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International application No

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