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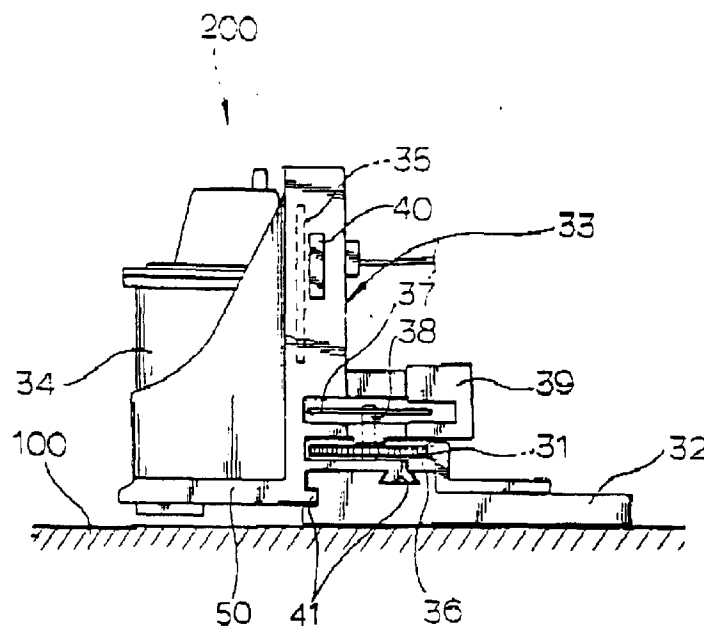
AL LT LV MK RO SI(30) Priority: **21.05.1998 KR 1842398**(71) Applicant: **SAMSUNG ELECTRONICS CO. LTD.**
Suwon-city, Kyounggi-do 441-742 (KR)(72) Inventor: **Kim, Dong Hun,**
812-1804, Hanshin Apt.
Suwon, Kyonggido (KR)

(74) Representative:

Tunstall, Christopher Stephen et al
Dibb Lupton Alsop,
Fountain Precinct
Balm Green, Sheffield S1 1RZ (GB)(54) **Multipurpose printing apparatus**

(57) A multipurpose printing apparatus is described, consisting of a base frame (32) and a user-movable main frame (50) including a printhead. A position detector (22) detects the position of the printhead relative to the base frame and the printing apparatus control means controls the printhead to print output data corre-

sponding to the position detected by the position detector. The position detector includes a rotational gear (36) on the main frame which engages a linear gear (31) on the base frame, a circular encoder (37) which is coupled to the rotational gear and a sensor element (39) for detecting the degree of rotation of the circular encoder. The apparatus is useful for printing on a variety of objects.

**FIG. 3****EP 0 958 923 A2**

Description

BACKGROUND TO THE INVENTION

[0001] The present invention relates to a printing apparatus.

[0002] A printer is a typical computer peripheral output device for forming an image on a recording medium. In particular, ink-jet printer are popular with users due to their low price and high print quality.

[0003] Fig. 1 shows the structure of a conventional ink-jet printer. In Fig. 1, a sheet of paper 11 is fed by a line feed motor and a carriage 13 in which an ink-cartridge 12 is mounted prints an image on the paper 11, while reciprocating across the paper 11. The ink in the ink-cartridge 12 is injected at specified time intervals, while the carriage 13 is driven at constant speed. After completion of a line of printing, a line feed is performed so that the paper 11 is moved to the correct position for the next line. The driving of the carriage motor at constant speed and the ejection of the ink from the ink-jet head are controlled by periodic distributed timing based on a standard clock of the printer system. Thus, these operations of all part of the ink-jet printer controlled by a timing value so that the printing operation can be performed at maximum speed.

[0004] However, ink-jet printers cannot be used to print an image onto an object which does not coincide with the structure of the printer. That is, if the size and structure of the object is different from that of the paper, the printing operation cannot be performed. For example, it is not possible to print the image directly onto a surface of a box using the printer. Instead, after printing the image onto paper, the printed paper must be attached to the surface of the box.

SUMMARY OF THE INVENTION

[0005] It is therefore an object of the present invention to provide a multipurpose printing apparatus which can print directly onto various kinds of objects.

[0006] Accordingly, the present invention provides a multipurpose printing apparatus comprising:

a stationary part and a movable part including a printhead;
a position detector for detecting the position of the printhead relative to the stationary part; and
control means for controlling the printhead to print from an output data store output data corresponding to the position detected by the position detector.

[0007] Preferably, the multipurpose printing apparatus further comprises:

the output data store; and
means for receiving the output data from a computer into the output data store.

[0008] The means for receiving the output data may comprise a wireless communications interface.

[0009] Preferably, the stationary part comprises a base frame in which a linear gear is mounted and the movable part comprises a main frame and a sensor, mounted on one side of the main frame, and adapted to generate position information while reciprocating along the linear gear.

[0010] Preferably, the printhead is an ink-jet printhead; the movable part further comprises an ink-carriage, including the printhead, which is mounted on the other side of the main frame; and the control means is adapted to control ink-ejection operations of the ink-carriage according to the position information from the sensor.

[0011] The sensor may comprise a rotational gear which engages the linear gear of the base frame, a circular encoder which is coupled to the rotational gear and a sensor element for detecting the degree of rotation of the circular encoder. The circular encoder may be a graduated transparent film or it may be formed with periodically spaced holes. The sensor element may be an infrared sensor element.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The present invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a conventional ink-jet printer;

Fig. 2 is a block diagram of a printing apparatus according to the present invention;

Fig. 3 is a left side view showing the printing apparatus according to the present invention; and

Fig. 4 is the other side view.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] In Fig. 2, the printing apparatus according to the present invention comprises a data storage part 21 for storing a data, position detecting part 22 for detecting a variation of a print head, a printing control part 23 for controlling a printing operation so that the data output from the data storage part 21 is printed on a position corresponding to a position information from the position detecting part 22 and a printing operation part 24 for performing the printing operation according to a signal from the printing control part 23.

[0014] The data storage part 21 stores data output from a data generating apparatus or a computer. The data to be stored in the data storage part 21 may be transmitted by wire or wireless. In order for the printing control part 23 to perform the printing operation, position information of the print head at present is needed. The information is provided by the position detecting part 22.

The printing operation part 24 is controlled by the printing control part 23 so as to print the data output from the data storage part 21 at a desired position according to the position information provided by the position detecting part 22.

[0015] In Figs. 3 and 4, the multipurpose printing apparatus 200 comprises a base frame 32, a main frame 50 which slides in a guiding groove 41 formed in the base frame 32, a sensing part 33 for generating a position information signal, an ink-cartridge 34 which is mounted on one side of the main frame 50 and a control circuit part 35 for controlling an ejection operation of the ink-cartridge 34 according to the position information from the sensing part 33. A linear gear 31 is horizontally disposed on the base frame 32. The sensing part 33 is mounted on the other side of the main frame 50 and reciprocates along the linear gear 31. The control circuit part 35 is mounted in the main frame 50.

[0016] The sensing part 33 comprises a rotational gear 36, a circular encoder 37 and a sensor 39 for detecting the degree of rotation of the circular encoder 37. The rotational gear 36 engages the linear gear 31. The circular encoder 37 is coaxial with the rotational gear 36 leaving a space in between, and a shaft 38 is fixed to the circular encoder 37 and the rotational gear 36 so that they rotate together.

[0017] The circular encoder 37 may be a transparent film which is marked with degrees or a laminate which is formed with a plurality of holes, periodically. The sensor 39 may be an infrared sensor.

[0018] Further, a printing button 40 for controlling the printing operation is disposed in the main frame 50.

[0019] To allow the printing operation to be performed, the printing apparatus 200 is placed on an object 100 on which the printing operation is to be performed. The main frame 50 is moved by a user to a printing position on which an image is to be printed. Since the sensing part 33 is fixed on the main frame 50, the sensing part 33 is also moved to the printing position. Further, if the printing button 40 is not pressed during movement of the main frame 50, the ink ejection operation is not performed.

[0020] If the printing button 40 is pressed during the movement of the main frame 50 by the user, the rotational gear 36 of the sensing part 33 rotates while engaging with the linear gear 31 of the base frame 32, and the main frame moves along the guiding groove 41.

[0021] Rotational of the rotational gear 36 is transmitted to the encoder 37 through the shaft 38. Therefore, the amount of rotation of the encoder 37 is the same as that of the rotational gear 36. The amount of rotation of the encoder 37 is detected by the infrared sensor 39. The detected signals are transmitted to the printing control part 23.

[0022] The printing control part 23 supplies an ink ejection signal to the ink-cartridge 34 so that data from the data storage part 21 is printed on the object according to the position information of the sensing part 33.

[0023] As described, the multipurpose printing apparatus according to the present invention can directly perform the printing operation on the object. Therefore, it is possible to perform the printing operation on various objects. Further, since it is not necessary to use a carriage driving motor and a line feed motor, the structure of the printing apparatus can be simplified.

10 Claims

1. A multipurpose printing apparatus comprising:

a stationary part and a movable part including a printhead;
a position detector for detecting the position of the printhead relative to the stationary part; and
control means for controlling the printhead to print from an output data store output data corresponding to the position detected by the position detector.

2. The multipurpose printing apparatus according to claim 1 further comprising:

the output data store; and
means for receiving the output data from a computer into the output data store.

3. The multipurpose printing apparatus according to claim 2 in which the means for receiving the output data comprises a wireless communications interface.

4. The multipurpose printing apparatus according to any preceding claim in which:

the stationary part comprises a base frame in which a linear gear is mounted; and
the movable part comprises a main frame and a sensor, mounted on one side of the main frame, and adapted to generate position information while reciprocating along the linear gear.

5. The multipurpose printing apparatus according to claim 4 in which:

the printhead is an ink-jet printhead;
the movable part further comprises an ink-carriage, including the printhead, which is mounted on the other side of the main frame; and
the control means is adapted to control ink-ejection operations of the ink-carriage according to the position information from the sensor.

6. The multipurpose printing apparatus according to claim 5 in which the sensor comprises a rotational

gear which engages the linear gear of the base frame, a circular encoder which is coupled to the rotational gear and a sensor element for detecting the degree of rotation of the circular encoder.

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7. The multipurpose printing apparatus according to claim 6 in which the circular encoder is a graduated transparent film.

8. The multipurpose printing apparatus according to claim 6 in which the circular encoder is formed with periodically spaced holes.

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9. The multipurpose printing apparatus according to any one of claims 6-8 in which the sensor element is an infrared sensor element.

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10. A multipurpose printing apparatus as described herein with reference to and as illustrated in FIGs. 2-4 of the accompanying drawings.

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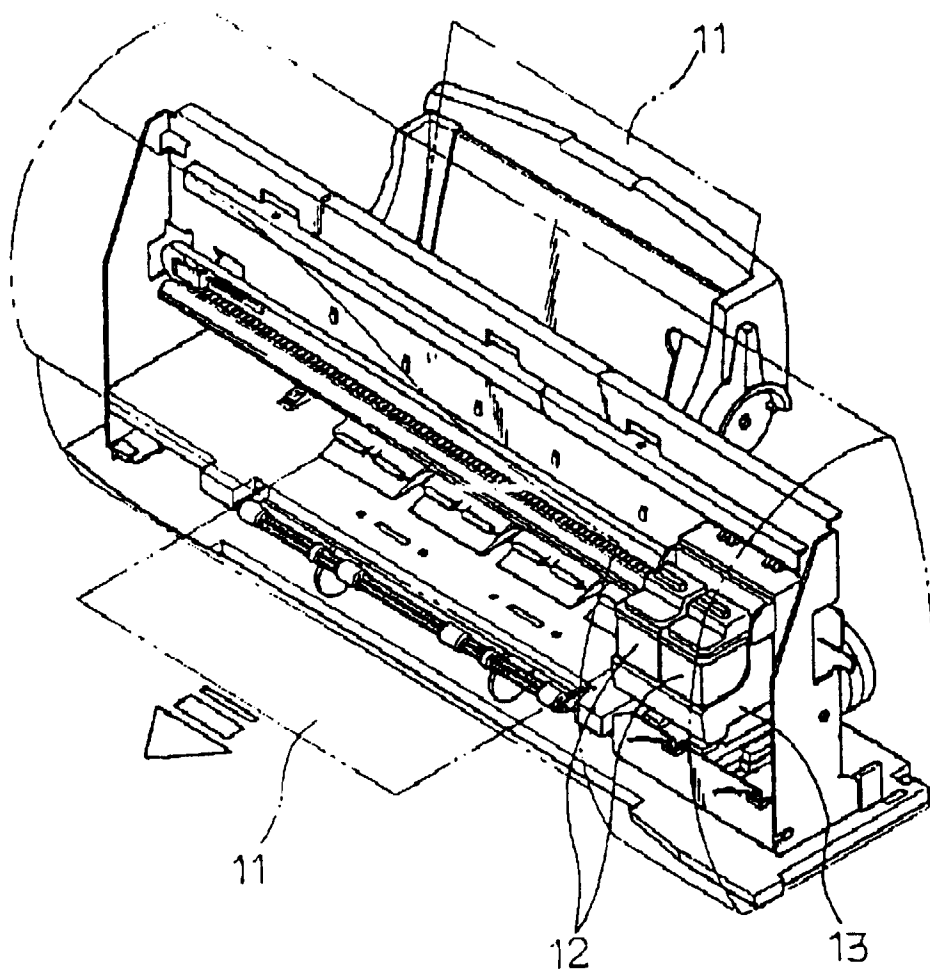


FIG. 1
(Prior Art)

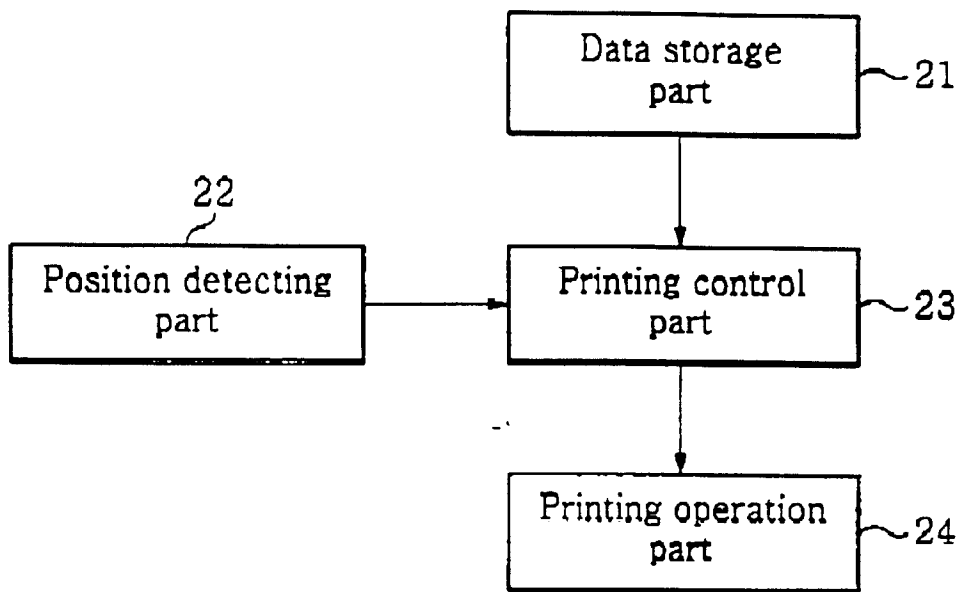


FIG. 2

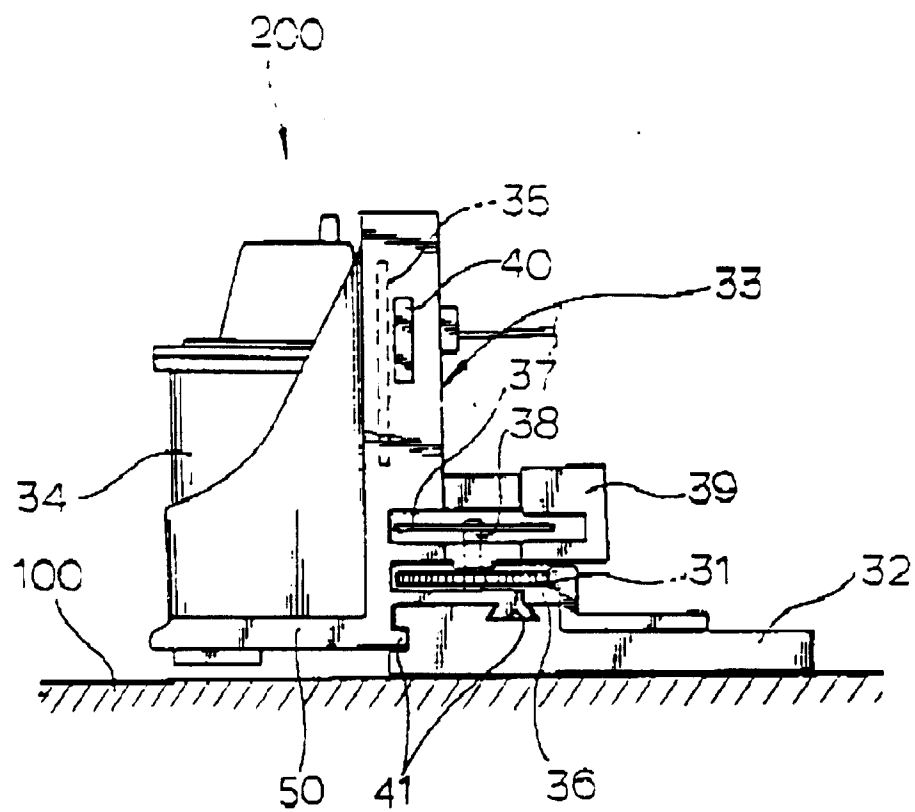


FIG. 3

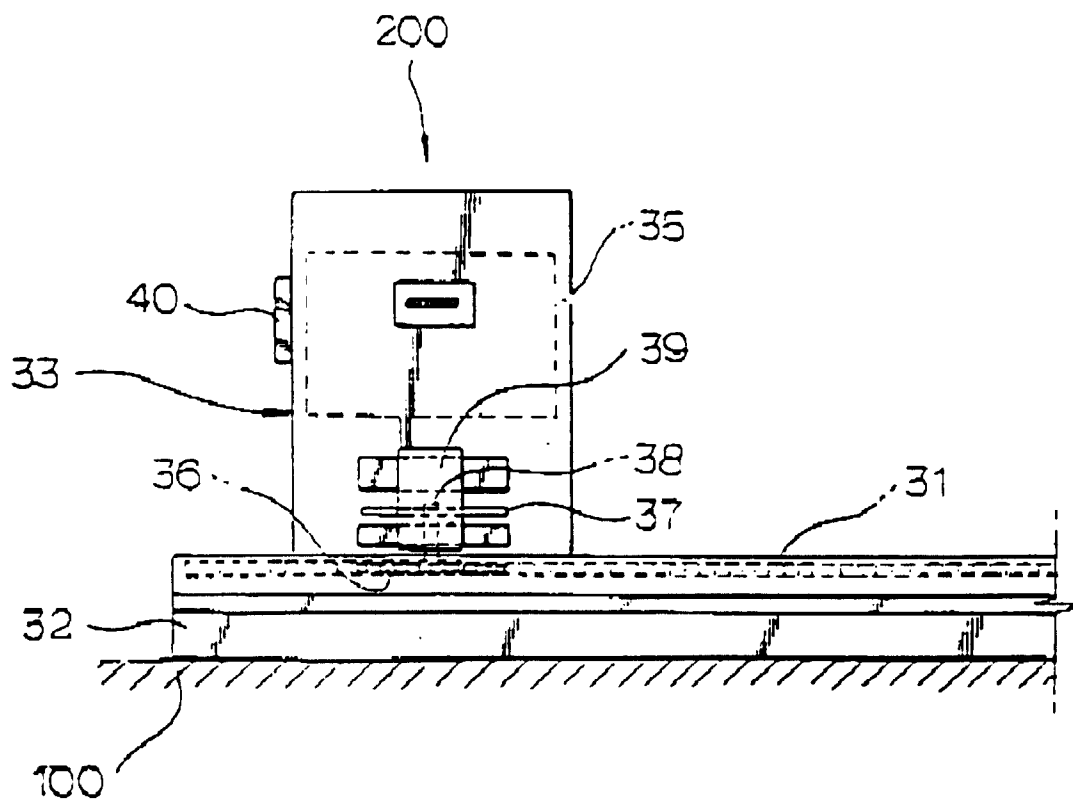


FIG. 4