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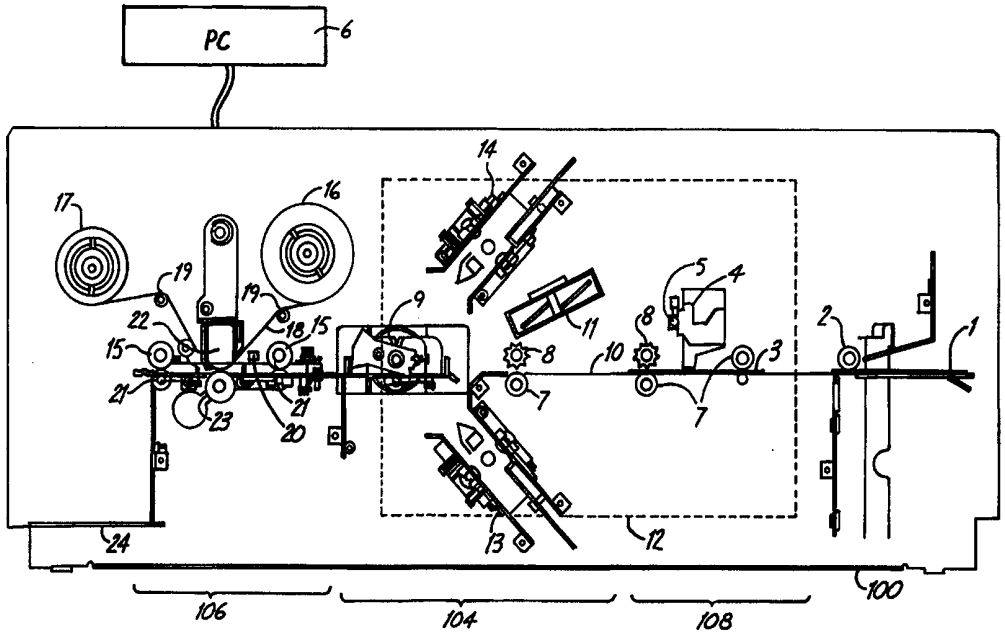

(57) Abstract

An identification card printer (10) is adapted to receive a supply of identification cards (3) and print material onto the cards (3) sequentially. A lamination station (104) is provided for laminating over the ink jet printing to protect the printing on the printed card (3) from the environment. A flipping mechanism (9) is positioned between the lamination station (104), a magnetic encoder (13), and a smart encoder (14), and an ink jet printhead (4) in order to laminate, encode, and print on both sides of the cards (3).

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INK JET IDENTIFICATION CARD PRINTER WITH LAMINATION STATION

BACKGROUND OF THE INVENTION

The present invention relates to ink jet printers. More specifically, the invention relates to an ink jet printer for printing onto an identification card which includes a lamination station for laminating the identification card.

Identification cards are widely used to carry information relating to the card holder, for example. The use of such identification cards is becoming more and more widespread and they are used for many purposes, such as driver licenses, identification badges, etc. In the past, identification cards have been manufactured using a labor intensive process in which an individual's data was manually stamped or imprinted onto a card. Additionally, in some cases an instant photograph was taken of the subject and adhered or laminated to a card. However, with the advent of computers, manufacturing of identification cards has become increasingly automated. An individual's data may be obtained from a computer database and formatted by the computer. The formatted information is then provided to a special printer for printing onto the identification card. Subsequently, the identification card may be laminated to protect the printed information.

This prior art automated identification card printing technique has worked well for large scale operations which can justify the expense of an expensive identification card printer. Such printers may include, for example, a dye sublimation type printer. For example, the Persona® identification card printer available from Fargo Electronics, Inc. of Eden Prairie,

Minnesota is an example of one type of dye sublimation identification card printer. Further, for longer wear and security, the printed card may be subsequently laminated.

However, as computer systems have become less expensive, the expense of identification card printers has prevented the use of identification cards from finding even more widespread use, particularly in small operations or in implementations having a limited budget. In such situations, if identification cards are required, an expensive identification card printer must be obtained which is more suitable for large scale operations. If this is not possible, a simple, rudimentary prior art identification card impression device must be obtained. Such a device is very limited in its versatility. Alternatively, the identification card must be written out by hand on cardboard, for example, and placed into a plastic sleeve.

None of these solutions are particularly attractive and have left the small user with only limited identification card printing options. Furthermore, it would also be desirable for large scale users to utilize less expensive identification card printers thereby increasing their cost savings as well.

SUMMARY OF THE INVENTION

An identification card printer is adapted to receive a supply of identification cards. The ink jet printer for printing material on the cards sequentially, and a lamination station for providing a cover laminated over the ink jet printing to protect the printing on the printed card from the environment (i.e., light, water, chemical, abrasion).

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a simplified cross-sectional view of an identification card printer in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides a low cost, high quality printer for printing identification cards. In the present invention, an ink jet printer is used to perform the printing function. Ink jet printers are relatively fast, reliable and relatively inexpensive to produce. However, the prior art has largely failed in its attempts to provide such an identification card printer. The present invention is well suited for low volume identification card production. However, cost savings can be obtained in high volume installations as well. The printer may be coupled to a computer whereby identification cards are inexpensively produced. Further, the production of such cards can be on an as needed basis in which cards are printed on demand and can be immediately put into use. For example, the printer of the present invention could be used to produce identification badges at a guard desk at the entrance to an industrial facility. Further, in the prior art, most inexpensive identification card printers have required a separate laminating step or the cards have been required to be carried in transparent, waterproof pouches and are sensitive to light, water, chemical or physical abrasion.

Figure 1 is a simplified side cross-sectional view of an ink jet identification card printer with a lamination station 100 in accordance with one embodiment of the present invention. Printer 100 may be divided into three general areas, printing station 102, intermediary station 104 and laminating station 106.

Printer 100 is shown coupled to a controller, such as a personal computer 6 which is used to provide information for printing onto an identification card 3 and controlling operation of printer 100. Additionally, an internal circuit board 12 provides internal control of operation of printer 100.

Printer 100 includes an input hopper 1 which is adapted for receiving an identification card. One such card is the UltraCard 3 coated with the invention described in ink jet printable surface commonly called "Tuff-Coat"™ in the trade available from Fargo Electronics, Inc. of Eden Prairie, Minnesota. However, other types of identification cards may be used. In one preferred embodiment, the identification card 3 comprises a substrate of teslin. In another embodiment, a thick paper stock is used. An input roller 2 moves the identification card 3 from input hopper 1 along an identification card path toward ink jet print head 4. Ink jet print head 4 may comprise any type of ink jet print head and may optionally include an ink jet ink cartridge for supplying ink jet ink. Print head 4 moves along a rod 5 in a direction generally perpendicular to the direction of the path followed by identification card 3. Identification card 3 is held in place and moved past print head 4 using pinch or drive rollers 7 and star roller 8. Star roller 8 has a plurality of ridges adapted to secure card 3 and maintain registration of card 3 relative to print head 4. However, in another embodiment, a circular roller is used which has a substantially circular outer circumference. A position sensor (not shown) may also be provided such that the location of card 3 can be monitored as card 3 moves along the card path through

printer 100. After printing, card 3 moves out of printing station 102 and into intermediary station 104.

Following printing, and before entry into intermediary station 104, card 3 is moved through drying/holding area 10 and a fan 11 produces an air flow directed toward card 3. This allows ink from the ink jet print head 4 to dry on card 3. Another pinch roller 7 and star roller 8 move card 3 into intermediary station 104 and into a flipping device 9.

Flipping device 9 rotates about its axis such that card 3 may be selectively moved down into a magnetic card encoder 13 and/or up into a smart card encoder 14. Encoders 13 and 14 draw card 3 inward and include data encoder such that additional data may be encoded onto card 3. Stations other than smart card and magnetic card encoders may be provided. Further, flipper 9 may move card 3 between additional stations as desired. Following the encoding process, flipper 9 moves card 3 out of intermediary station 104 and into laminating station 106.

Laminating station 106 includes transport rollers 15 which are used to move card 3 therethrough. A laminate material 18 is moved between a supply roll 16 and a take up roll 17 past rollers 19 and heater 22. In one preferred embodiment, laminate material 18 comprises thermal transfer over laminate film available from Fargo Electronics, Inc. A platen 23 is provided to press card 3 against heater 22. Heater 22 includes an actuator (not shown) to press laminate material 18 against card 3. Pinch rollers 21 are provided opposite transport rollers 15 and used to secure card 3 and maintain registration of card 3 during the lamination process. In one embodiment, laminate material 18 comprises a plurality of individual laminates carried on a web. A

sensor 20 is provided to sense the position of the individual laminates carried on web 18. Operation of laminating station 106 may be in accordance with that described in U.S. Patent No. 5,807,461, entitled LAMINATION TECHNIQUE which issued September 15, 1998 and is incorporated herein by reference.

In one aspect of the present invention, card 3 may be moved back into flipper 12 and the card rotated 180°. This allows both sides of card 3 to be laminated with laminate material 18. Double sided lamination is particularly advantageous with the identification card is made of thin flexible material such as paper, because the extra lamination adds strength to the card. Further, those skilled in the art will recognize that through the use of flipper 12, information may be printed onto both sides of the card 3 using print head 4, or data may be recorded on both sides of card 3 using encoders 13 and 14.

After the printing and lamination process is complete, card 3 is moved to output hopper 14. In some embodiments, multiple cards may be processed simultaneously with the various cards positioned at various locations within printer 100. Typically, printer 100 is controlled by circuitry on circuit board 12 in accordance with instructions from PC 6. However, such control can be exclusively with printer 100, exclusively within PC 6, or shared therebetween.

In one embodiment, flipping mechanism 9 operates in a manner similar to that disclosed in U.S. patent application Serial No. 08/854,969, entitled PRINTER WITH AUXILIARY OPERATION which was filed May 13, 1997 which is incorporated herein by reference.

Although the present invention has been described with reference to preferred embodiments,

workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. An identification card printer comprising a supply of identification cards, an ink jet printer for printing material on the cards sequentially, and a lamination station for providing a cover laminated over said ink jet printing to protect the printing on the printed card from the environment.

2. The identification card printer of claim 1 including an intermediate station for adding additional printed material to the card prior to lamination.

3. The identification card printer of claim 1 including a flipping mechanism positioned between the ink jet printer and the lamination station for selectively rotating the identification card.

4. The identification card printer of claim 3 including a data encoder adapted to record data under the identification card and wherein the flipping mechanism is positioned to move the printed identification card into the data encoder.

5. The identification card printer of claim 3 wherein the lamination station laminates a first side of the identification card and the flipping mechanism is adapted to flip the identification card whereby the lamination station subsequently laminates a second side of the identification card.

6. The identification card printer of claim 5 wherein the identification card comprises paper stock.

7. The identification card printer of claim 3 wherein the flipping mechanism is positioned to flip the identification card such that the ink jet printer may subsequently print on a second side of the identification card.

8. The identification card printer of claim 3 including a plurality of stations proximate the flipping

mechanism and wherein the flipping mechanism is adapted to direct the printed identification card into the intermediary stations.

9. The identification card printer of claim 1 including a drying area located between the ink jet printer and the lamination station, wherein the drying area is adapted to temporarily hold a printed identification card to thereby allow printed ink to dry thereon.

10. The identification card printer of claim 9 including a fan directed toward the drying area.

11. The identification card printer of claim 1 wherein the lamination station includes a heating element adapted to apply a laminate onto the printed identification card.

12. The identification card printer of claim 11 including a platen adapted to press the identification card against the heating element.

13. The identification card printer of claim 1 wherein the laminate is carried on a web.

14. The identification card printer of claim 13 wherein the web carries a plurality of individual laminates.

15. The identification card printer of claim 14 including a sensor adapted to sense position of the individual laminates carried on the web.

16. The identification card printer of claim 1 wherein the ink jet printer includes an ink jet print head adapted to move in a direction substantially perpendicular to a direction of the identification card.

17. The identification card printer of claim 1 including an input hopper adapted to carry a plurality of identification cards.

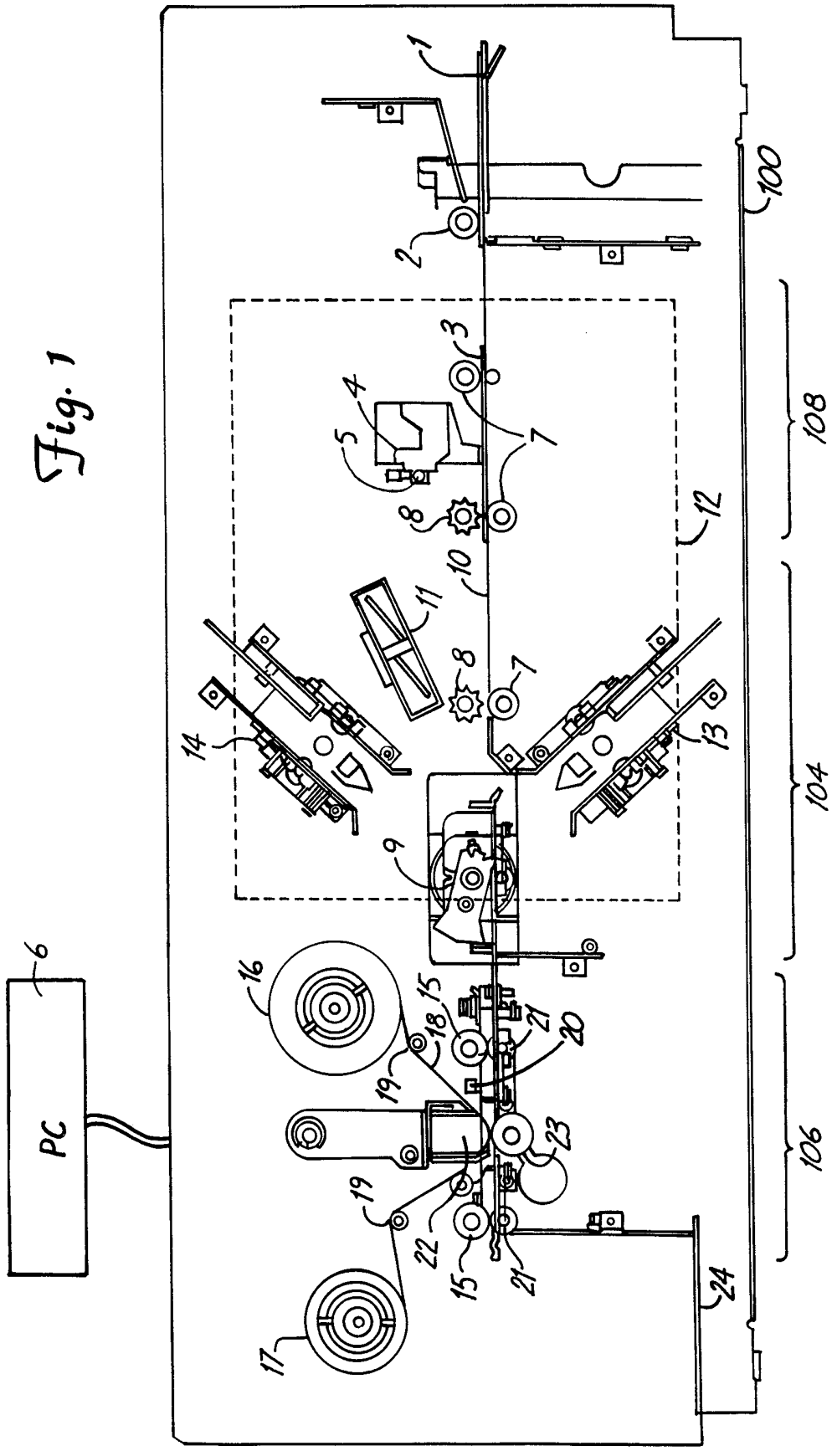
18. The identification card printer of claim 1 including an output hopper adapted to carry a plurality of identification cards.

19. The identification card printer of claim 1 including a data encoder adapted to record data onto the identification card.

20. The identification card printer of claim 19 wherein the data encoder comprises a magnetic recording element adapted to record data onto a magnetic strip carried on the identification card.

21. The identification card printer of claim 19 wherein the data encoder comprises a Smart card encoder.

Fig. 1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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/22501

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :B32B 31/100, GO6F 17/00, B41J 3/60

US CL :Please See Extra Sheet.

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)

U.S. : 347/101, 156/538, 384, 387, 235/488, 271/3.03, 65, 291, 185, 186, 301

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

NONE

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

APS search terms: (ink (2a) jet, laminat?, encod?, (id or identification), duplex

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,368,677 A (UEDA ET AL.) 29 NOVEMBER 1994 (29/11/94), see entire document.	1 and 9-17
X,E	US 5,837,991 A (LAMANNA ET AL.) 17 November 1998 (17/11/98), see entire document, especially column 26, lines 16 and 50 and column 27, lines 26-50.	1, 2, and 18-21
X,P	US 5,709,484 (DORNER) 20 January 1998 (20/01/98), see entire document, especially the abstract, column 6, lines 27-32.	3-5, 7, and 8
X.P	US 5,695,589 (GERMAN ET AL.) 9 December 1997 (9/12/97), see column 2, lines 58-59.	6
Y	US 5,327,201 (COLEMAN ET AL.) 5 July 1994 (05/07/94), see entire document, especially Figure 2 and column 11, lines 64-67.	3 and 8

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

347/101, 156/538, 384, 387, 235/488, 271/3.03, 65, 291, 185, 186, 301