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(54) Title: METHOD AND APPARATUS FOR FORMING PLATED LIQUID CRYSTALLINE POLYMER SUBSTRATE

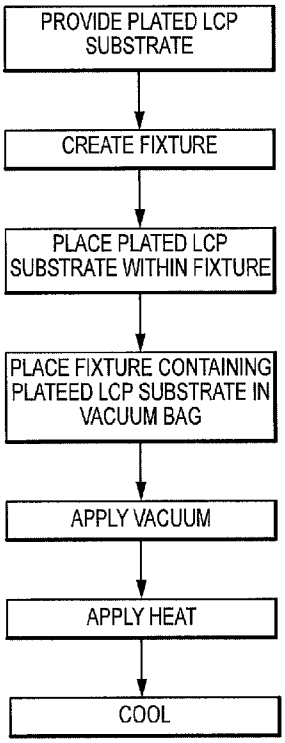

FIG.1

(57) Abstract: A method and apparatus for forming plated liquid crystalline polymer substrates which includes placing a plated liquid crystalline polymer substrate on or within a fixture and applying vacuum and heat to the fixture and the plated liquid crystalline polymer substrate. The plated liquid crystalline polymer substrate may contain printed circuits and can be formed to any shape, configuration, and size without destroying the printed circuits contained on the liquid crystalline polymer substrate.

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METHOD AND APPARATUS FOR FORMING PLATED LIQUID CRYSTALLINE POLYMER SUBSTRATE

Field of Invention

The present invention relates to a method and apparatus for forming plated liquid crystalline polymer substrates. More particularly, the present invention relates to a method and apparatus for forming plated liquid crystalline polymer substrates by placing a plated liquid crystalline polymer substrate within a fixture and applying vacuum and heat to the fixture containing the plated liquid crystalline polymer substrate.

Summary of the Invention

The present invention is directed to a method and apparatus for forming plated liquid crystalline polymer substrates. The plated liquid crystalline polymer substrates may contain printed circuits and can be formed to any shape, configuration, and size without destroying the printed circuits contained on the liquid crystalline polymer substrate.

One exemplary method of the present invention for forming a plated liquid crystalline polymer substrate includes the steps of providing a plated liquid crystalline polymer substrate, creating a fixture for containing the plated liquid crystalline polymer substrate, placing the plated liquid crystalline polymer substrate within the fixture, placing the fixture containing the plated liquid crystalline polymer substrate within a vacuum bag, heating the vacuum bag and fixture containing the plated liquid crystalline polymer substrate contained within the vacuum bag, and finally cooling the plated liquid crystalline polymer substrate and removing it from the fixture. The vacuum and heat applied to the plated liquid crystalline polymer substrate removes the memory of the plated liquid crystalline polymer substrate and changes the memory of the plated liquid crystalline polymer substrate to comport with the fixture. Subsequently, when the plated liquid crystalline polymer substrate is cooled and removed from the fixture, it retains a new memory which comports with the fixture.

Any number of different processing times may be used for the vacuum and heat in order to change the memory of the plated liquid crystalline polymer material. In another exemplary embodiment of the invention, the plated liquid crystalline polymer material contained within the fixture may be vacuum baked at 250 degrees Fahrenheit for approximately two hours. However, it will be understood by those skilled in the art that any number and variety of vacuum and heat parameters may be applied to the plated liquid crystalline polymer substrate as long as the vacuum and heat parameters allow the plated

liquid crystalline polymer substrate to advance through its melt properties before being allowed to cool.

It will be understood by those skilled in the art that any type of fixture may be utilized in accordance with the method for forming plated liquid crystalline polymer substrates in accordance with the present invention. A fixture used in accordance with the present invention may include a fixture having any shape, size, and configuration as long as the fixture enables a plated liquid crystalline polymer substrate to be held within or adjacent to the fixture.

Brief Description of the Drawings

Fig. 1 is a flow chart depicting an exemplary embodiment of the method of the present invention for forming plated liquid crystalline polymer substrates.

Fig. 2 is a sheet of drawings showing various views of an exemplary fixture that may be used in accordance with the method of the present invention for forming plated liquid crystalline polymer substrates.

Fig. 3 is a top view of the first layer of a plated liquid crystalline polymer substrate shown before a forming.

Fig. 4 is a front elevational view of the plated liquid crystalline polymer substrate shown before forming.

Fig. 5 is a top view of a second layer of plated liquid crystalline polymer substrate shown before forming.

Fig. 6 is a top view of the first layer of the plated liquid crystalline polymer substrate shown after forming.

Fig. 7 is a front elevational view of the plated liquid crystalline polymer substrate shown after forming.

CLAIMS

1. A method for forming a plated liquid crystalline polymer substrate comprising the steps of:

providing a plated liquid crystalline polymer substrate;

creating a fixture for containing or forming the plated liquid crystalline polymer substrate;

placing the liquid crystalline polymer substrate on or within the fixture;

placing the fixture and liquid crystalline polymer substrate within a vacuum bag;

heating the vacuum bag, the fixture, and the plated liquid crystalline polymer substrate; and

cooling the plated liquid polymer substrate and removing it from the fixture.

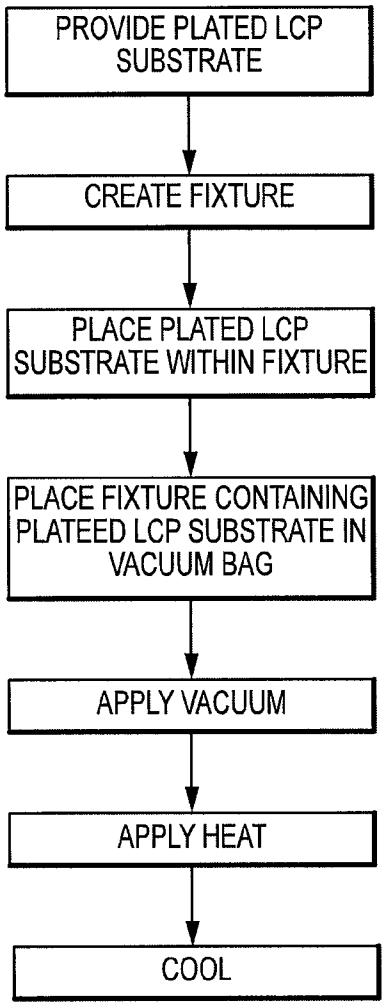
PROVIDE PLATED LCP SUBSTRATE
CREATE FIXTURE
PLACE PLATED LCP SUBSTRATE WITHIN FIXTURE
PLACE FIXTURE CONTAINING PLATEED LCP SUBSTRATE IN VACUUM BAG
APPLY VACUUM
APPLY HEAT
COOL

FIG.1

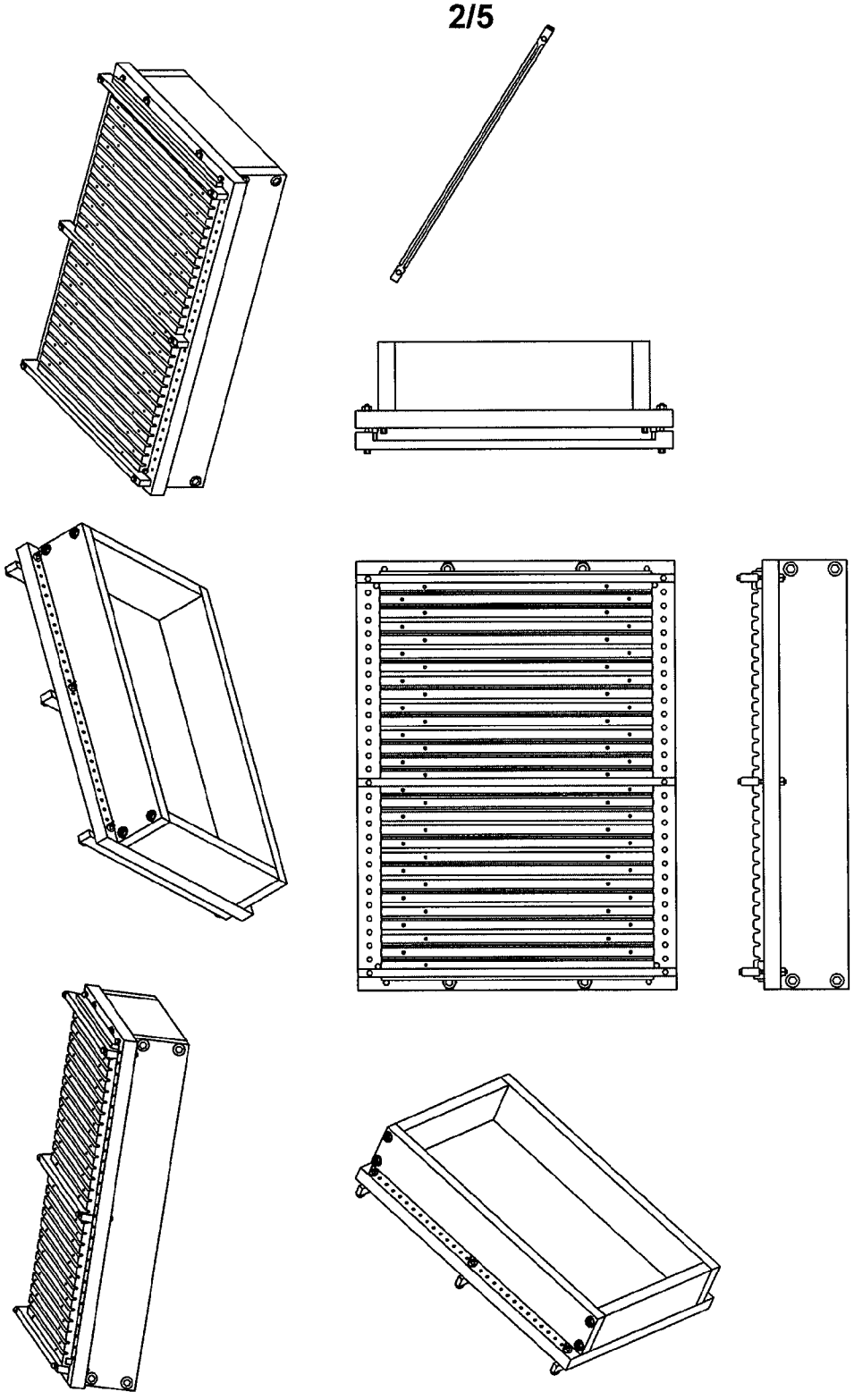

FIG.2

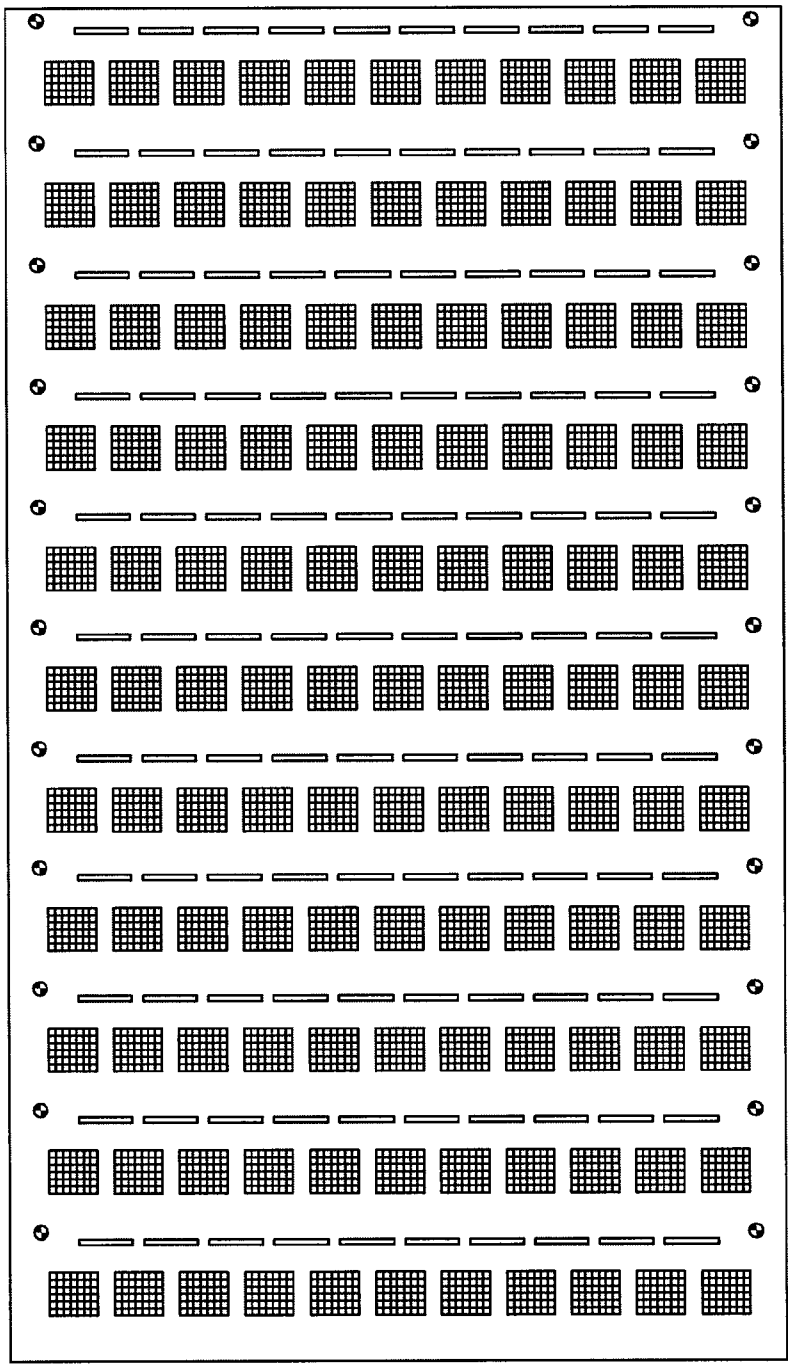

FIG.3

FIG.4

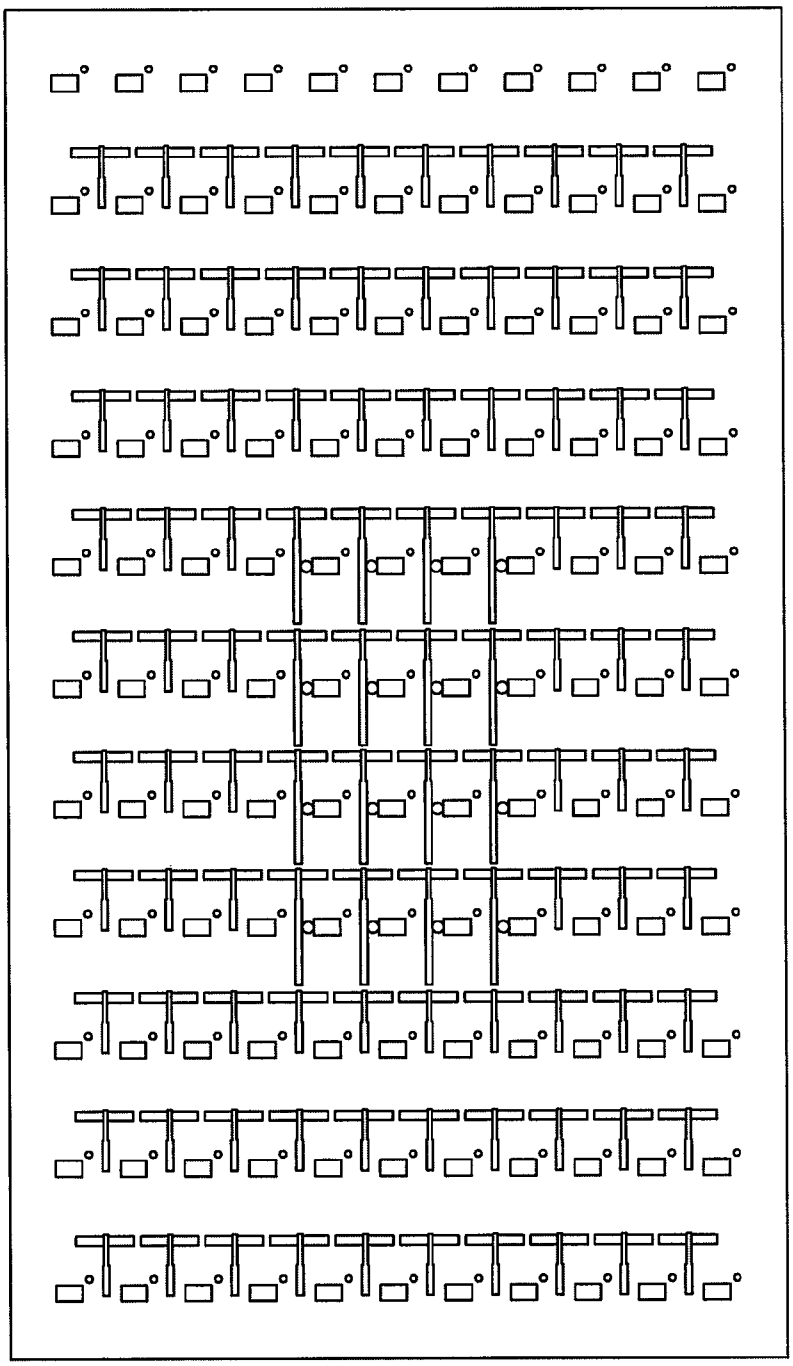

FIG.5

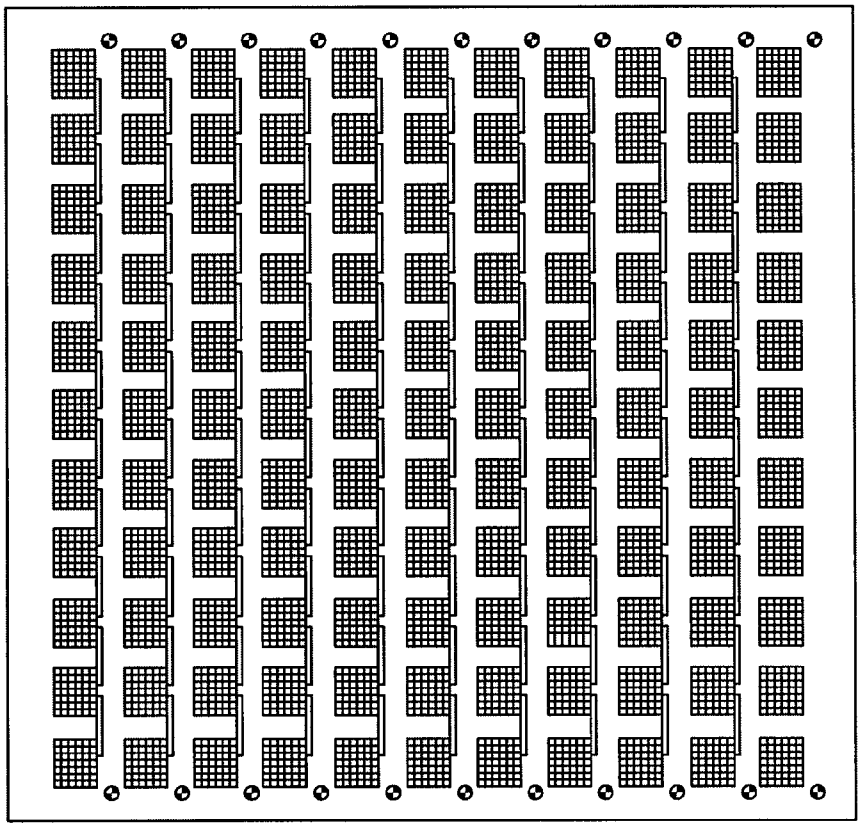

FIG.6

FIG.7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 08/64156

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G02F 1/13 (2008.04)
USPC - 349/194; 430/20
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)
USPC: 349/194; 430/20; 977/777; 349/58

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
West: US Pre-Grant Publication Full-Text; US Patents Full-Text; EPO Abstracts; JPO Abstracts , Google Scholar
Terms: Polymer, epoxy substrate, plated, liquid, crystalline, vacuum bags, cooling, heated, platen presses

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,967,705 B2 (Farquhar et al.) 22 Nov. 2005 (22.11.2005); See Description of Invention; col 7, lns 48-49; col 9, ln 57 to col 12, ln 10.	1
A	US 2005/0019527 A1 (Farquhar et al.) 27 Jan. 2005 (27.01.2005); See Description of Invention.	1

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"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

Date of the actual completion of the international search	Date of mailing of the international search report
21 Aug. 2008 (21.08.2008)	29 AUG 2008

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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