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(54) **STAMP FOR MAKING A MICROARRAY OF BIOMOLECULES**

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(58) **Field of Classification Search**
CPC B01J 19/0046; B01J 2219/00382; B01J 2219/00585; B01J 2219/00605;
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(56) **References Cited**

U.S. PATENT DOCUMENTS

5,948,621 A 9/1999 Turner et al.
2008/0280785 A1 11/2008 Tseng et al.
2008/0287322 A1 11/2008 Klapproth et al.

FOREIGN PATENT DOCUMENTS

JP 2001-343385 A 12/2001
WO 01 43876 A1 6/2001

OTHER PUBLICATIONS

Salim, A. et al., Micromachined Hydrogel Stamper for Soft Printing of Biomolecules with Adjustable Feature Dimensions, American Chemical Society, 2009, Analytical Chemistry, vol. 81, No. 11, Jun. 1, 2009, pp. 4551-4554.
(Continued)

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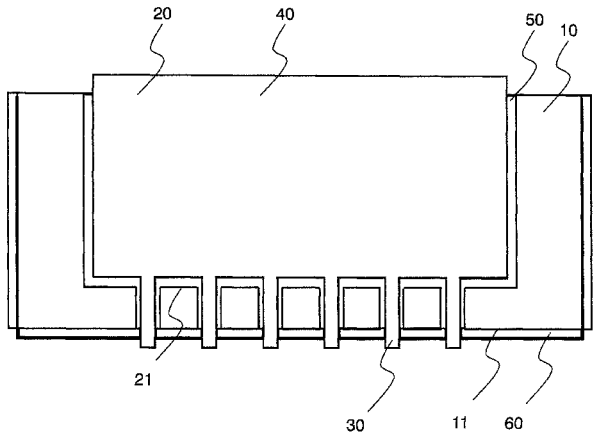
(57) **ABSTRACT**

A stamp for making a microarray of biomolecules, wherein the stamp has a stamp body having a stamping surface for stamping the biomolecules onto a substrate, a plurality of reservoirs for liquids having the biomolecules, wherein each of the reservoirs has a bottom wall and a plurality of
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