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(54) **COMPOSITE MATERIAL BASED INSULATED SHIPPING CONTAINER**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,482,499	A *	9/1949	Nagel	442/117
4,091,852	A *	5/1978	Jordan et al.	383/3
5,857,778	A *	1/1999	Ells	383/5
6,027,249	A *	2/2000	Bielinski	383/110
6,048,099	A *	4/2000	Muffett et al.	383/20
2007/0000932	A1 *	1/2007	Cron et al.	220/592.24

* cited by examiner

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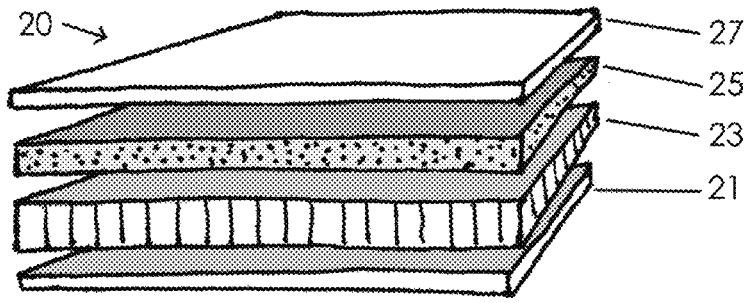
(57) **ABSTRACT**

A sandwich composite material for use in an insulated shipping container includes two different central (core) materials sandwiched between an inner and an outer skin material. The core contains a low density, high compressive strength cellular material and a low density, low thermal conductivity insulation fabric material. The inner and outer skin layers increase the overall flexural rigidity of the composite material. The sandwich composite material can be made into flat sheets of required size and integrated into a fabric sleeve to form the container. Alternatively, the sandwich composite material can be molded as the container to achieve uniform and continuous insulation and structural support.

10 Claims, 3 Drawing Sheets