

(12) **UK Patent Application** (19) **GB** (11) **2 390 434** (13) **A**

(43) Date of A Publication **07.01.2004**

(21) Application No: **0215234.6**

(22) Date of Filing: **02.07.2002**

(71) Applicant(s):
John Charles Duncan
38 Bramcote Road, LOUGHBOROUGH,
Leicestershire, LE11 2SA, United Kingdom

John Stanley Fisher
4 Orchard Close, EAST LEAKE,
Leicestershire, LE12 6PL, United Kingdom

Keith Edward Ernest Pettitt
17 Buckland Drive, Woodborough,
NOTTINGHAM, NG14 6EU,
United Kingdom

Jeffrey Glynn Van-de-Velde
81 Parklands Drive, LOUGHBOROUGH,
Leicestershire, LE11 2SZ, United Kingdom

(continued on next page)

(51) INT CL⁷:
G01N 1/28 3/08

(52) UK CL (Edition W):
G1S SAC SAG

(56) Documents Cited:
GB 2258734 A **GB 2165951 A**
GB 2135785 A **WO 1997/039332 A1**
US 5187987 A **US 3505854 A**

(58) Field of Search:
UK CL (Edition V) **G1S**
INT CL⁷ **G01N**
Other: **On-line: EPODOC, WPI, JAPIO**

(54) Abstract Title: **A sample holding device, or pocket, allowing the containment and subsequent analysis of materials within a dynamic mechanical analyser (DMA)**

(57) A Pocket, usually of an inert material, provides a suitable vessel for holding unusual materials such as a powder, in the analytical head of a stiffness measuring device, such as a dynamic mechanical analyser (Figure 4).

The pocket comprises, in one embodiment, a steel shim which has been folded over and the sample placed in the thus formed trough. A temperature sensor may be placed in the trough prior to closure by sealing or welding.

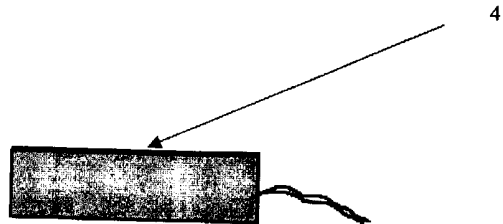


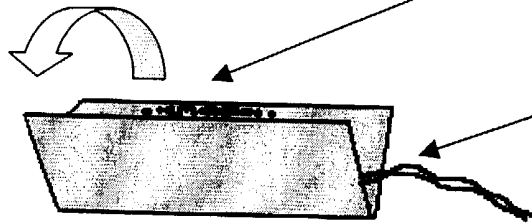
Figure 3

GB 2 390 434 A



1

Figure 1



2

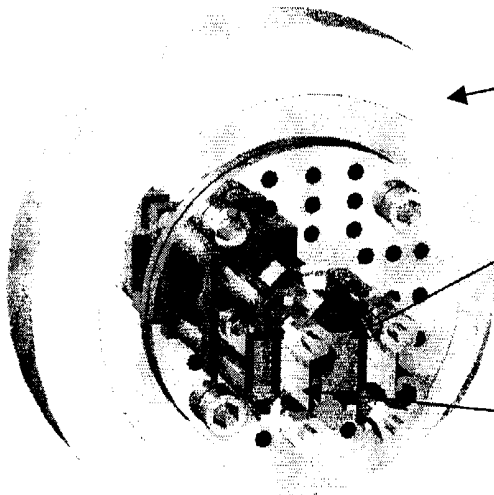
3

Figure 2



4

Figure 3



5

6

7

Figure 4

A SAMPLE HOLDING DEVICE, OR POCKET, ALLOWING THE CONTAINMENT AND SUBSEQUENT ANALYSIS OF MATERIALS WITHIN A DYNAMIC MECHANICAL ANALYSER (DMA)

The invention relates to a device allowing powders, liquids, solid films, foams, bars or any other sample form of material to be mounted within a Dynamic Mechanical Thermal Analyser (alternatively described as a DMA, Dynamic Mechanical Spectrometer(DMS) or any other device or instrument that measures the stiffness of a material).

DMAs are well known instruments used for characterising materials such as polymers by determining the stiffness of the material over range of temperatures or frequencies.

The essential components include an electro-mechanical drive unit, a device for measuring displacement, an environmental chamber to facilitate heating and cooling of the sample, an electronics unit to control and process the measurement signals and various sample holding devices (otherwise known as frames and clamps).

The measurement of stiffness is achieved by imposing a small, well defined deformation on the sample and then sensing the displacement and phase shift between the displacement and applied force.

The results given by this equipment allows users to obtain information concerning the viscoelastic behaviour, damping characteristics and thermal behaviour of the sample being examined.

According to the present invention, there is provided a device for holding samples such as powders, liquids, solid films, foams, bars or any other sample form of material in a manner different to existing frames and sample clamps in a dynamic mechanical analyser.

The device normally comprises of a pocket formed by folding usually, though not exclusively, a small piece of steel shim or other material around the sample.

The pocket can either be open topped or not as required by the operator or as the sample dictates.

The pocket can also be formed with or without the inclusion of a temperature sensor.

The most common mode used to analyse a material is bending deformation. Typically, a bar sample is supported by clamping across a fixed frame and then flexed from the middle or at one end whilst holding the outer sides or side rigidly. The device described can be mounted in the instrument in place of a bar sample and utilising the bending deformation mode, though alternative mounting methods may also be employed.

The invention comprises of a pocket of an inert material, usually steel, that is produced around the sample. The pocket so formed may or may not fully enclose the material that is being analysed and may or may not include a temperature sensor.

Figure 1 shows a pocket mounted in position inside a dynamic mechanical analyser.

Figure 2 shows a pocket fully formed with a contained test sample but not mounted in the dynamic mechanical analyser

Figure 3 shows a pocket with a sample powder inside prior to being closed to secure the test sample.

Figure 4 shows a pocket prior to folding into a 'trough' ready to accept a test sample.

CLAIMS

1. A device that can enclose, support and hold powders, liquids, thin films, bars, foam samples or any other sample form for analysis in a dynamic mechanical analyser.
2. A device that can fully seal and protect the sample from the surrounding environment prior to and during the performance of dynamic mechanical analysis.
3. A device that facilitates sample mounting for any automated handling or robotic system.
4. A device that can hold both sample and temperature probe in close proximity within the analytical chamber of a dynamic mechanical analyser.

Referring to the drawing attached, the pocket comprises of a material such as a steel shim as shown in Figure 1. It is useful, though not essential that the mid line of the shim is scored or etched to aid folding along the mid line (1).

The shim is folded (as shown in Figure 2) and the test sample material is placed in the trough as shown (2). If required, a temperature sensor is placed in the trough, prior to closure of the pocket (3).

The pocket is then closed as shown in Figure 3 and may if required be welded or sealed around the edges (4) to prevent ingress of air or humidity.

The pocket (6) is then mounted in the analytical fixture (5) of the dynamic mechanical analyser or similar stiffness measurement device, as shown in Figure 4. The pocket is usually, though not exclusively mounted using a bending configuration (7).



INVESTOR IN PEOPLE

Application No: GB 0215234.6
Claims searched: ALL

Examiner: Michael Walker
Date of search: 18 September 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1-4	GB 2135785 A	(FISCHER) see abstract
X	1-4	US 3505854	(US GOVERNMENT) see abstract
X	1-3	GB 2258734 A	(HETTIARATCHI) see abstract
X	1-3	GB 2165951 A	(WESTERN GEOPHYSICAL) see abstract
X	1,3,4	US 5187987	(ANDERSON et al.) see abstract
X	1,3	WO 97/39332 A1	(CORNING et al.) see abstract

Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^v:

G1S

Worldwide search of patent documents classified in the following areas of the IPC⁷ :

G01N

The following online and other databases have been used in the preparation of this search report :

On-line: EPODOC, WPI, JAPIO