

COMMONWEALTH OF AUSTRALIA

The Patents Act 1952

630276

CONVENTION APPLICATION FOR A PATENT

We, TBA INDUSTRIAL PRODUCTS LIMITED, a company organized under the laws of England, of 20 St Mary's Parsonage, Manchester M3 2NL, England, hereby apply for the grant of a Patent for an invention entitled "SHEET SEALING MATERIAL" which is described in the accompanying complete specification.

This application is a Convention application and is based on the Application Numbered 9003416.6 for a patent or similar protection made in United Kingdom on 15 February 1990.

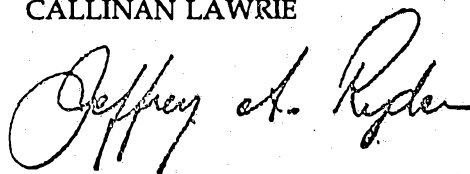
Our address for service is care of CALLINAN LAWRIE, Patent Attorneys, of 278 High Street, Kew, 3101, Victoria, Australia.

D A T E D this 15 day of February 1991.

TBA INDUSTRIAL PRODUCTS LIMITED

By their Patent Attorneys:

CALLINAN LAWRIE



To: The Commissioner of Patents.

CALLINAN LAWRIE
PRIVATE BAG 7, KEW,
VICTORIA 3101, AUSTRALIA

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Patents Act 1952

PATENT

Declaration in Support of an Application for a Patent

*Strike out for non-convention

In support of the *Convention** application made for a patent ~~patent of addition~~ for an invention entitled

Sheet sealing material

Insert full name and address of declarant

I, Robert Franklin Hadfield
of Bowdon House, Ashburton Road West, Trafford Park, Manchester M17 1RA,
ENGLAND.

do solemnly and sincerely declare as follows:

1. ~~I am the applicant(s) for the~~ ~~patent of addition~~
~~patent~~ (or in the case of an application by a body corporate)

1. I am authorised by TBA INDUSTRIAL PRODUCTS LIMITED
the applicant for the ~~patent of addition~~ patent to make this declaration on its behalf.

2. The basic application(+) as defined by section 141 of the Act is ~~not~~

Strike out Para. 2 for non-convention

Filing Date	Country	Applicant(s)
15 February '90	United Kingdom	TBA Industrial Products Limited

Insert details for the/or EACH basic application

Strike out Para. 3 for non-convention

3. The basic application(+) referred to in this Declaration ~~was~~ ^{was} the first application(+) made in a Convention country in respect of the invention the subject of the application.

4. ~~I am~~ ~~the actual inventor(s) of the invention~~
~~was~~ (or, where a person other than the inventor is the applicant):

Insert full name(s) and address(es) of inventor(s)

4. John Robert Hoyes and Stephen Woolfenden
of 2 The Brook, 10 Southview,
Calderbrook Road, Bamford,
Littleborough, Lancashire, Rochdale, OL11 5HU,
OL15 9NW, ENGLAND ENGLAND

~~is~~ are the actual inventor(s) of the invention and the facts upon which the applicant is entitled to make the application are as follows:

By virtue of an assignment dated 9 February 1990

See over for instructions

DECLARED AT MANCHESTER, ENGLAND

No Legalization No Corporate Seal

this 21st day of January 1991
for TBA INDUSTRIAL PRODUCTS LIMITED

Robert F Hadfield

Signature of Declarant
Robert Franklin Hadfield,
Authorised Signatory

To: The Commissioner of Patents.

(12) PATENT ABRIDGMENT (11) Document No. AU-B-71055/91
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 630276

- (54) Title
SHEET SEALING MATERIAL
- International Patent Classification(s)
(51)⁵ **F16J 015/10**
- (21) Application No. : **71055/91** (22) Application Date : **15.02.91**
- (30) Priority Data
- (31) Number (32) Date (33) Country
9003416 15.02.90 GB UNITED KINGDOM
- (43) Publication Date : **22.08.91**
- (44) Publication Date of Accepted Application : **22.10.92**
- (71) Applicant(s)
TBA INDUSTRIAL PRODUCTS LIMITED
- (72) Inventor(s)
JOHN ROBERT HOYES; STEPHEN WOOLFENDEN
- (74) Attorney or Agent
CALLINAN LAWRIE , Private Bag 7, KEW VIC 3101
- (56) Prior Art Documents
JP 2077484
US 4900629

- (57) Claim
- 1 Sheet sealing material from which gaskets can be cut for sealing against an aggressive chemical, the material having surfaces of a sintered PTFE resin in which is dispersed an inert inorganic filler substantially all of which is of particle size less than 106 μm , said material having, interposed between said surfaces, a core of sintered PTFE resin in which is dispersed inert inorganic filler at least 17.5% of whose weight is formed by particles of size greater than 106 μm .

AUSTRALIA

Form 10

PATENTS ACT 1952

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

Short Title:

Int. Cl:

Application Number:
Lodged:

Complete Specification - Lodged:
Accepted:
Lapsed:
Published:

630276

Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant: TBA INDUSTRIAL PRODUCTS LIMITED

Address of Applicant: a corporation organized and existing under the laws of England, of 20 St Mary's Parsonage, Manchester M3 2NL, England

Actual Inventors: John Robert HOYES and Stephen WOOLFENDEN

Address for Service: CALLINAN LAWRIE, Patent & Trade Mark Attorney, 278 High Street, Kew, Victoria 3101, Australia.

Complete Specification for the invention entitled:

"SHEET SEALING MATERIAL"

The following statement is a full description of this invention, including the best method of performing it known to me:-

SHEET SEALING MATERIAL



This invention relates to sheet sealing material, and more particularly to sheet sealing material from which gaskets can be cut for use in sealing against so-called "aggressive chemicals."

Such gaskets are for example used in the pulp and paper, petrochemical, plating and food processing industries, and it is well known to make them of a sintered polytetrafluoroethylene (PTFE) resin, that is to say of a resin whose predominant repeating unit is $-CF_2.CF_2-$. To reduce to acceptable limits the creep relaxation or cold flow which such resins suffer under flange pressure, it has long been the practice to load the PTFE with an inorganic filler (other than the asbestos previously employed in gasketing) which is capable not only of reinforcing the material to provide a good seal but also of withstanding attack from whatever liquid is to be



confined. Thus, barium sulphate may be used as inert filler if strongly alkaline liquids are involved and quartz (crystalline silica) as inert filler against strong acids. With hydrofluoric acid, graphite is employed.

Gaskets of the kind just described, recommended for use to 260° C, have been available for at least the past 10 years (see for example brochure GDAL-11/78-30M published 1978 by Garlock of Canada Ltd) and are still available (see for example GYLON: Non-asbestos gasketing, TP-Rev 6/86-20M, Garlock 1986). A typical product contains about 45% by weight of quartz, of particle size 75 µm and below, with most of it passing a 53 µm aperture sieve.

A suitable method of making sheet from which the gaskets can be cut, the so-called HS-10 process of du Pont, is described in an article published by the Valve Manufacturers Association of America and entitled "PTFE-based gasketing materials", presented by David G Lingard of Garlock Inc at the Asbestos Substitute Gasket and Packing Materials Seminar held in Houston, Texas in August 1986. In order to ensure that the materials have good sealing properties, the inert filler employed is very fine - eg 75 µm and below as already indicated, or in general not greater than 106 µm (= BS sieve no. 150), so that the surfaces of the gasket are closely conformable to the surfaces to be sealed. However,

it is very difficult to incorporate such fine filler in a PTFE resin so that it is uniformly dispersed therein, and the resulting lack of homogeneity is often reflected in a sealing capability which varies considerably over the area of the sintered sheet product.

It has occurred to us that, simply because the filler in the surfaces of the gasket material is required to be very fine, it does not follow that very fine filler has to be used throughout the thickness of the material; and that if relatively coarse filler is made use of in the body as distinct from the surfaces, then to that extent the difficulties of incorporating filler are reduced.

According to the invention, there is provided sheet sealing material from which gaskets can be cut for sealing against an aggressive chemical, the material having surfaces of a sintered PTFE resin in which is dispersed an inert inorganic filler substantially all of which is of particle size less than 106 μm , characterised in that there is interposed between said surfaces a core of sintered PTFE resin in which relatively coarse inert inorganic filler is dispersed. By "relatively coarse" we mean that at least 17.5% by weight of core filler should be of particle size greater than 106 μm . To achieve a balance of desirable properties in the sintered sheet product and gaskets made from it, it is

preferred that 20-35% by weight of the core filler should be of particle size above 106 μm . The remainder is of particle size below 106 μm . Preferably at least 7.5% by weight of the core filler, and particularly 10-25% by weight, is of particle size greater than 150 μm . Preferably the core filler has no substantial content of particles of size greater than 250 μm .

The invention is further illustrated by the following Example.

Example

Preparation of Surface Layers

Paraffin was blended with a tape-making grade of PTFE powder, the quantity of paraffin being such as to be absorbed completely by the polymer. Fine-ground quartz (about 98% by weight passing a sieve of aperture 106 μm , and about 85% passing 45 μm) was then blended with the paraffin-polymer mix.

The mix was fibrillated by passing it between calender bowls and the resulting sheet was cross-fibrillated by passing multiple thicknesses, at right-angles to the previous passage, again between the calender bowls. This cross-fibrillation was repeated several times to build up the green strength and uniformity of the sheet. At the conclusion of this stage the sheet thickness was 0.5 mm, with biaxial orientation of the PTFE.

Preparation of Core

A core was prepared by following generally the procedure just described, with the difference that the quartz employed was relatively coarse: about 26% of it by weight was retained by (ie about 74% passed) a sieve of aperture 106 μm , while about 12.5% by weight was retained on a 150 μm sieve, about 7.5% on a 200 μm sieve and <1% on a 250 μm .



Preparation of Laminate Sheet

The core was placed between two surface layers, and the assembly was formed into a laminate by calendering. The paraffin was then removed completely from the sheet by heating, and the material was then sintered by heating at 350-400°C. The properties of the product were as follows:

Thickness (mm)	1.6
Specific gravity	2.1
Compressibility (%) (ASTM F36)	7.3
Recovery (%) (ASTM F36)	44
Tensile strength (ASTM F152)	11.5 (direction A) 10.2 (at 90° to A)
Stress relaxation (MPa) (BS Condition/40 MPa/250°C)	17.2
Gas leakage (ml/min) (DIN)	0.77
Liquid leakage (ml/hour) (ASTM F37)	0.42
* Acid resistance	+0.1

* % change in thickness after immersion in 98% H₂SO₄ for 16 hours at room temperature.

Following generally the procedure of the above Example, sintered sheet sealing material from which alkali-resistant gaskets can be cut is made by using, instead of quartz, barium sulphate of the particle size characteristics set out above for quartz.


 The claims defining the invention are as follows:-

- 1 Sheet sealing material from which gaskets can be cut for sealing against an aggressive chemical, the material having surfaces of a sintered PTFE resin in which is dispersed an inert inorganic filler substantially all of which is of particle size less than 106 μm , said material having, interposed between said surfaces, a core of sintered PTFE resin in which is dispersed inert inorganic filler at least 17.5% of whose weight is formed by particles of size greater than 106 μm .
- 2 Sheet sealing material according to claim 1, in which 20-35% by weight of the core filler is of particle size greater than 106 μm .
- 3 Sheet sealing material according to claim 1 or 2, in which at least 7.5% by weight of the core filler is of particle size greater than 150 μm .
- 4 Sheet sealing material according to claim 1, 2 or 3, in which both surface filler and core filler are of quartz.

5 Sheet sealing material according to claim 1, substantially as described herein with reference to the Example.

6 A gasket cut from the sheet sealing material of any preceding claim.

DATED This 15 day of February 1990

TBA INDUSTRIAL PRODUCTS LIMITED
by their Patent Attorneys
CALLINAN LAWRIE

