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PCT/TCO/V/ 8

ORIGINAL: English

DATE: August 29, 1975

WORLD INTELLECTUAL PROPERTY ORGANIZATION
GENEVA

PATENT COOPERATION TREATY

INTERIM COMMITTEE FOR TECHNICAL COOPERATION

Fifth Session

Geneva, October 29 to November 3, 1975

RESULTS OF THE TEST CONDUCTED BY THE
INTERNATIONAL PATENT INSTITUTE (IIB) ON
THE INTERNATIONAL SEARCH REPORT

Report prepared by the International Bureau

INTRODUCTION

Background

1. At its fourth session in November 1974, the PCT Interim Committee for Technical Cooperation (hereinafter referred to as "the Interim Committee") felt that it would be particularly useful if, pending the establishment of the final version of the international search report, one or more of the prospective International Searching Authorities were prepared to test the present draft of the international search report form. The test was to be carried out on the basis of the results of an earlier search relating to a patent document which had already been published, to find out any practical problems which might arise in using the form.

2. The IIB at that session declared its readiness to undertake such a test.

Brief Summary of the Results of the Test

3. Attached to this document is the report of the IIB which indicates the technical fields in which tests were carried out and the results which were obtained. In summary, the results show that the use of the present draft of the international search report form did not present any major practical problems. However, the test did raise some questions on the part of the IIB which are relevant to the Administrative Instructions.

4. The Interim Committee is invited to consider and give its comments on the results of the test carried out by the IIB.

[The report of the IIB follows]



INSTITUT INTERNATIONAL DES BREVETS

TÉLÉPHONE:

906789

ADRESSE TÉLÉGRAPHIQUE:

BREVPATENT

TÉLEX No. 31.651

ADRESSE:

PATENTLAAN 2. RIJSWIJK (Z.H.)
(PAYS-BAS)

VDC/93/lc

Mr. J. FRANKLIN
Head PCT Section Industrial Property
Division,

W I P O
32, Chemin des Colombettes

1211 G E N E V E 20
Suisse

RIJSWIJK (Z.H.), le August 4th, 1975

Dear Mr. Franklin,

Please find enclosed the result of the test
on the international search report form.

As it was already agreed on, the form has been
completed for three cases. Moreover, it has been
found more convenient if copies of the first pages of
the cited documents are annexed to the three reports
subject of the present test.

Yours sincerely,

A handwritten signature in dark ink, appearing to read 'A. Vandecasteele', is written over a horizontal line.

A. VANDECASTEELE
Conseiller au Service Technique

cc.: M. J.A.H. van Voorthuizen
Dep. Technical-Director

INSTITUT INTERNATIONAL DES BREVETS

TEST ON THE USE OFTHE INTERNATIONAL SEARCH REPORT FORM

At the fourth session of the Interim Committee for Technical Cooperation, the IIB declared its readiness to undertake a test on a draft of the international search report form before it was finalized. Such a test should be done by completing this draft form on the basis of the results of an earlier search relating to a patent document which has already been published (see PCT/TCO/IV/18, § 51).

The test has been made for three search results: one in the chemical field, one in the electrical-physical field and one in the mechanical field, by taking real cases handled at the IIB. For this test, the form in its draft coded PCT/ISA/210 (June 1975) has been used and the administrative instructions as contained in the third revised draft (see PCT/AAQ/VI/2 of July 1, 1975) have been followed.

The results are given in the following annexes:

- Annex I : Search report relating to a patent document in the chemical field
- Annex II : Search report relating to a patent document in the field of physics
- Annex III : Search report relating to a patent document in the mechanical field.

Each of the annexes includes also copies of the front pages of the documents cited in the report.

The following information has been put on the form:

- Filing date of the application
- Priority date claimed (if any)
- Classification of subject matter (heading I of the form)
- Fields searched (heading II of the form)
- Documents considered to be relevant (heading VI of the form)

The test did not raise major problems in completing the international search report form. Following comments are submitted for consideration.

General:

- Attention is drawn to the fact that the instructions for completing the column "category" of heading "VI Documents considered to be relevant", are contained in two different sections, (505 and 508) separated by sections 506 and 507 relating to other items. It is not quite clear from the present instructions that documents containing relevant prior art may be cited, without any indication of appartenance to a special category.

- The category code "X" (document of particular relevance) has been considered as not applicable to documents which do not concern the whole inventive concept but only a detail which e.g. forms the subject-matter of a sub-claim.

to annex I:

- The 4th citation refers to a "Chemical Abstracts" volume issue on April 8, 1974. The cited abstract concerns a Japanese patent which, according to the information given in the abstract, was published on September 30, 1972. The abstract per se was considered of particular relevance. Consequently, the two codes X and P were applied.

to annex II:

- The 1st citation refers to a periodical in which the location of the publisher is mentioned but not the place of the publication. Consequently, this was put in the report with the explicit mention "location of the publisher".

- The issue of the periodical containing the citation has been identified by the number of the volume, the number of the issue and the date of the issue.

to annex III:

- The 1st citation refers to the patent document DT - A - 949 855 which mentions the date on which it was put open to public inspection ("Patentanmeldung bekanntgemacht am 27. April 1950") and the date of the issuance ("Ausgegeben am 27. September 1956). The former date has been mentioned in the search report as the date of publication.

- For the 2nd citation (FR-A- 1.337.636), the date of the publication is not mentioned on the document. This date has been identified after consultation at the library of the "Bulletin officiel de la propriété industrielle" and is the following: 13 September 1963.

- The 3rd citation (FR-A- 2.169.550) is a category P document. Moreover, it has an application date, 28 January 1972, which is earlier than the priority date of the application searched.

**PATENT COOPERATION TREATY
INTERNATIONAL SEARCH REPORT**

page 5

page 6

IDENTIFICATION OF INTERNATIONAL APPLICATION	
International Application No. ¹	International Filing Date ¹ 22 December 1972
Receiving Office ¹	Priority Date Claimed ² 22 December 1971
Applicant ¹	

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ³
According to International Patent Classification (IPC) or to both National Classification and IPC
Int. Cl.: C 08 J 9/26, C 08 J 9/28

II. FIELDS SEARCHED	
Minimum Documentation Searched ⁴	
Classification System	Classification Symbols
Int.Cl.:	C 08 J 9/26, C 08 J 9/28, C 08 G 18/08, C 08 G 18/10
Patent Documentation Searched other than Minimum Documentation ⁵	
DT 1877 - 1920	BE from 1926 on
FR 1902 - 1920	LU from 1946 on
GB 1909 - 1920	NL from 1912 on

III. TITLE, ABSTRACT AND FIGURE OF DRAWING
1. The following indicated items are approved as submitted by the applicant: ⁶ <input type="checkbox"/> Title. <input type="checkbox"/> Abstract.
2. The texts established by this International Searching Authority of the following indicated items are set forth on a supplemental sheet: ⁶ <input type="checkbox"/> Title. <input type="checkbox"/> Abstract.
3. <input type="checkbox"/> This report is incomplete as far as the abstract is concerned as the time limit for comments by the applicant on the draft prepared by this International Searching Authority has not expired. ⁷
4. The figure of the drawings indicated below is to be published with the abstract: ⁸ <input type="checkbox"/> Figure No. _____ as suggested by the applicant. ⁹ <input type="checkbox"/> Figure No. _____ because: <input type="checkbox"/> applicant failed to suggest a figure. ¹⁰ <input type="checkbox"/> this figure better characterizes the invention. ¹⁰

IV. <input type="checkbox"/> UNITY OF INVENTION IS LACKING ¹¹ (Observations on supplemental sheet)

V. <input type="checkbox"/> CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹² (Observations on supplemental sheet)

III. <input type="checkbox"/> TITLE, ABSTRACT ⁶	Page ...
This International Searching Authority has established the following text of the:	
<input type="checkbox"/> Title. <input type="checkbox"/> Abstract.	

NOTES TO FORM PCT/ISA/210

These Notes are intended to facilitate the use of the present form. For full information, see the text of the Patent Cooperation Treaty and the texts of the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and the said texts, the latter are applicable. "Article" refers to Articles of the Treaty, "Rule" refers to Rules of the Regulations and "Section" refers to Sections of the Administrative Instructions.

- 1 "The international search report shall identify the International Searching Authority which established it by indicating the name of such Authority, and the international application by indicating the international application number, the name of the applicant, the name of the receiving Office, and the international filing date." (Rule 43.1)
- 2 "The international search report shall be dated and shall indicate the date on which the international search was actually completed. It shall also indicate the filing date of any earlier application whose priority is claimed." (Rule 43.2)
- 3 "The international search report shall contain the classification of the subject matter at least according to the International Patent Classification." (Rule 43.3 (a))
"Such classification shall be effected by the International Searching Authority." (Rule 43.3 (b))
"Where the subject matter of the international application must be provided with different classification symbols according to the principles to be followed in the application of the International Patent Classification to any given patent document, the international search report shall indicate all such symbols." (Section 504 (a))
"Where any national classification system is used, the international search report may indicate all the applicable classification symbols also according to that system." (Section 504 (b))
"Where the subject matter of the international application is classified both according to the International Patent Classification and to any national classification system, the international search report shall indicate the corresponding symbols of both classifications opposite each other." (Section 504 (c))
- 4 "The international search report shall list the classification identification of the fields searched. If that identification is effected on the basis of a classification other than the International Patent Classification, the International Searching Authority shall publish the classification used." (Rule 43.6 (a))
- 5 "If the international search extended to patents, inventor's certificates, utility certificates, utility models, patents or certificates of addition, inventor's certificates of addition or published applications for any of those kinds of protection, of States, periods, or languages, not included in the minimum documentation as defined in Rule 34, the international search report shall, when practicable, identify the kinds of documents, the States, the periods, and the languages to which it extended. For the purpose of this paragraph, Article 2 (ii) shall not apply." (Rule 43.6 (b))
- 6 "Subject to paragraphs (b) and (c), the international search report shall either state that the International Searching Authority approves the title and the abstract as submitted by the applicant or be accompanied by the text of the title and/or abstract as established by the International Searching Authority under Rules 37 and 38." (Rule 44.2 (a))
- 7 "If, at the time the international search is completed, the time limit allowed for the applicant to comment on any suggestion of the International Searching Authority in respect of the abstract has not expired, the international search report shall indicate that it is incomplete as far as the abstract is concerned". (Rule 44.2 (b))
- 8 "Where it is the International Searching Authority which, under Rule 8.2, indicates the figure or figures of the drawings to be published with the abstract, that Authority shall notify the applicant and the International Bureau accordingly." (Section 507)
- 9 The figure suggested by the applicant is indicated in the check list of the request; see Rule 3.3 (a) (iii).
- 10 "If the applicant fails to make the indication referred to in Rule 3.3 (a) (iii), or if the International Searching Authority finds that a figure or figures other than that figure or those figures suggested by the applicant would among all the figures of all the drawings, better characterize the invention, it shall indicate the figure or figures which it so considers. Publication by the International Bureau shall then use the figure or figures so indicated by the International Searching Authority. Otherwise, the figure or figures suggested by the applicant shall be used in the said publications." (Rule 8.2)
- 11 This part of the report is filled in only where, in the course of the procedure preceding the issuance of this report the International Searching Authority, having found that the international application does not comply with the requirement of unity of invention, invites the applicant to pay additional fees (see Article 17 (3) (a))
"If the applicant paid additional fees for the international search, the international search report shall so indicate. Furthermore, where the international search was made on the main invention only

(Article 17 (3) (a)), the international search report shall indicate what parts of the international application were and what parts were not searched." (Rule 43.7)

- 12 This part of the report is filled in only where Article 17 (2) (b) applies. (Where certain claims were not searched because of lack of unity of invention and non-payment of additional fees, part IV—rather than this part—is filled in.) Article 17 (2) reads as follows:

"(a) If the International Searching Authority considers

- (i) that the international application relates to a subject matter which the International Searching Authority is not required, under the Regulations, to search, and in the particular case decides not to search, or
- (ii) that the description, the claims, or the drawings, fail to comply with the prescribed requirements to such an extent that a meaningful search could not be carried out,

the said Authority shall so declare and shall notify the applicant and the International Bureau that no international search report will be established.

"(b) If any of the situations referred to in subparagraph (a) is found to exist in connection with certain claims only, the international search report shall so indicate in respect of such claims, whereas, for the other claims, the said report shall be established as provided in Article 18."

- 13 See Article 17 (2) (a) (i), quoted in note 12, above, and Rule 39 reading as follows:

"No International Searching Authority shall be required to search an international application if, and to the extent to which, its subject matter is any of the following:

- (i) scientific and mathematical theories,
- (ii) plant or animal varieties or essentially biological processes for the production of plants and animals, other than microbiological processes and the products of such processes,
- (iii) schemes, rules or methods of doing business, performing purely mental acts or playing games,
- (iv) methods of treatment of the human or animal body by surgery or therapy, as well as diagnostic methods,
- (v) mere presentations of information,
- (vi) computer programs to the extent that the International Searching Authority is not equipped to search prior art concerning such programs."

- 14 See Article 17 (2) (a) (ii), quoted in note 12, above.

- 15 "The objective of the international search is to discover relevant prior art." (Article 15 (2))

Rule 33.1, entitled "Relevant Prior Art for International Search," reads as follows:

"(a) For the purposes of Article 15 (2), relevant prior art shall consist of everything which has been made available to the public anywhere in the world by means of written disclosure (including drawings and other illustrations) and which is capable of being of assistance in determining that the claimed invention is or is not new and that it does or does not involve an inventive step (i.e., that it is or is not obvious), provided that the making available to the public occurred prior to the international filing date.

"(b) When any written disclosure refers to an oral disclosure, use, exhibition, or other means whereby the contents of the written disclosure were made available to the public, and such making available to the public occurred on a date prior to the international filing date, the international search report shall separately mention that fact and the date on which it occurred if the making available to the public of the written disclosure occurred on a date posterior to the international filing date.

"(c) Any published application or any patent whose publication date is later but whose filing date or, where applicable, claimed priority date, is earlier than the international filing date of the international application searched, and which would constitute relevant prior art for the purposes of Article 15 (2) had it been published prior to the international filing date, shall be specially mentioned in the international search report."

- 16 "Where any document cited in the international search report is of particular relevance, the special indication required by Rule 43.5 (c) shall consist of the "X" placed next to the citation of the said document." (Section 505)

"Where any document cited in the international search report refers to an oral disclosure, use, exhibition, or other means referred to in Rule 33.1 (b), the separate indication required by that Rule shall consist of the letter "O" placed next to the citation of the said document." (Section 508 (a))

"Where any document cited in the international search report is a published application or patent as defined in Rule 33.1 (c), the special mention required by that Rule shall consist of the letter "E" placed next to the citation of the said document." (Section 508 (b))
"Where any document cited in the international search report is a document which defines the general state of the art, it shall be

indicated by the letter "G" placed next to the citation of the said document." (Section 508 (c))

"Where any document cited in the international search report is a document whose publication date occurred earlier than the international filing date of the international application, but later than the priority date claimed in that application, it shall be indicated by the letter "P" next to the citation of the said document." (Section 508 (d))

17 "The international search report shall contain the citations of the documents considered to be relevant." (Rule 43.5 (a))

"Identification of any document cited in the international search report referred to in Rule 43.5 (b) shall be made by indicating the following elements in the order in which they are listed:

(a) *In the case of any patent document* (patent documents being patents within the meaning of Article 2 (ii) as well as published applications relating thereto)

- (i) the Office that issued the document, by the two-letter code as in *Annex B*;
- (ii) the kind of document, by the appropriate symbols as in *Annex C*;
- (iii) the number of the document as given to it by the Office that issued it;
- (iv) the date of publication as indicated on the patent document; and
- (v) where applicable, the pages, columns or lines where the relevant passages appear, or the relevant figures of the drawings.

(b) *In the case of any book or other separately issued publication*

- (i) the name of the author;
- (ii) the title (including, where applicable, the number of the edition and/or volume);
- (iii) the year, month and day of publication (where only less precise data appears on the book or other separately issued publication, such as the year and month, or only the year, then only such data as appear thereon need be indicated unless the complete data are readily available from an authoritative source);
- (iv) the name of the publisher;
- (v) the place of publication (where only the location of the publisher appears on the book or other separately issued publication, then that location shall be indicated as the place of publication); and
- (vi) where applicable, the pages, columns or lines where the relevant passages appear, or the relevant figures of the drawings.

(c) *In the case of any article published in a periodical or other serial publication*

- (i) the title of the periodical or other serial publication;
- (ii) the number of the volume and the date of the issue in which the article appears;

(iii) the place of publication (where only the location of the publisher appears in the periodical or other serial publication, then that location shall be indicated as the place of publication);

(iv) the author and the title of the article and the number of the page both on which the article starts and ends; and

(v) where applicable, the pages, columns or lines where the relevant passages appear, or the relevant figures of the drawings.

(d) *In the case of abstracts*

(i) the identification of the document containing the abstract in the manner set forth in paragraph (a), (b) or (c), respectively, depending upon whether the abstract is contained in a patent document, in a book or other separately issued publication, or in an article published in a periodical or other serial publication;

(ii) in the case where the abstract is not published together with the full text document which served as its basis, the identification of the full text document on the basis of whatever bibliographic data may be available in respect thereto." (Section 503)

18 "If only certain passages of a cited document are relevant or particularly relevant, they shall be identified, for example, by indicating the page, column, or the lines, where the passage appears." (Rule 43.5 (e))

19 "Citations which are not relevant to all the claims shall be cited in relation to the claim or claims to which they are related."

(Rule 43.5 (d))

"The manner of indicating the claims to which cited documents are relevant shall be indicated by placing in the appropriate column of the international search report:

(i) where the cited document is relevant to one claim, the number of that claim; for example (2) or (17).

(ii) where the cited document is relevant to two or more claims numbered in consecutive order, the numbers of the first and last claims of the series connected by a hyphen; for example, (1-15) or (2-3),

(iii) where the cited document is relevant to one or more claims that are not numbered in consecutive order, the number of each claim placed in ascending order and separated by a comma or commas; for example, (1,6) or (1,7,10),

(iv) where the cited document is relevant to more than one series of claims under (ii) above, or to claims of both categories (ii) and (iii) above, the series or individual claim numbers and series placed in ascending order using commas to separate the several series, or to separate the numbers of individual claims and each series of claims; for example, (1-6, 9-10, 12-15) or (1, 3-4, 6, 9-11)." (Section 509)

20 "The international search report shall be signed by an authorized officer of the International Searching Authority." Rule 43.8)

RÉPUBLIQUE FRANÇAISE

⑪ 1.565.943

MINISTÈRE DE L'INDUSTRIE

INSTITUT NATIONAL
DE LA PROPRIÉTÉ INDUSTRIELLE

BREVET D'INVENTION

- ⑪ N° du procès verbal de dépôt 152.334 - Paris.
 ⑫ Date de dépôt 17 mai 1968, à 16 h 29 mn.
 Date de l'arrêté de délivrance : 24 mars 1969.
 ⑬ Date de publication de l'abrégé descriptif au
Bulletin Officiel de la Propriété Industrielle. 2 mai 1969 (n° 18).
 ⑭ Classification internationale D 06 n/B 29 d 3/00.

⑮ Procédé pour fabriquer un matériau foliiforme poreux.

⑯ Invention :

⑰ Déposant : Société dite : ALGEMENE KUNSTIJDE UNIE N.V., résidant aux Pays-Bas.

Mandataire : Office Blétry.

⑳ Priorité conventionnelle :

㉑ ㉒ ㉓ Brevet déposé aux Pays-Bas le 18 mai 1967, n° 67/06.867 au nom de la
demanderesse.

⑲ RÉPUBLIQUE FRANÇAISE

INSTITUT NATIONAL
DE LA PROPRIÉTÉ INDUSTRIELLE

PARIS

⑲ BREVET D'INVENTION

PREMIÈRE ET UNIQUE
PUBLICATION

- ⑲ Date de dépôt 14 avril 1970, à 15 h 55 mn.
 Date de la décision de délivrance 22 février 1971.
 Publication de la délivrance B.O.P.I. — «Listes» n. 9 du 5-3-1971.

⑳ Classification internationale (Int. Cl.) .. C 08 j 1/00.

㉑ Déposant : Société dite : POLYMER CORPORATION LIMITED. Constituée selon les
lois de la Province d'Ontario, Canada, résidant au Canada.

㉒ Mandataire : Simonnot, Rinuy, Santarelli.

㉓ Compositions cellulaires poreuses et leur procédé de production.

㉔ Invention de :

㉕ ㉖ ㉗ Priorité conventionnelle : *Demande de brevet déposée au Canada le 5 mai 1969,*
n. 50.500 au nom de la demanderesse, cessionnaire de : Albert Ernest
*Smith et James Charles Ingram.*⑲ N° de publication :
(A n'utiliser que pour
le classement et les
commandes de reproduction.)

2.046.196

⑲ N° d'enregistrement national :
(A utiliser pour les paiements d'annuités,
les demandes de copies officielles et toutes
autres correspondances avec l'I.N.P.I.)

70.13427

RÉPUBLIQUE FRANÇAISE

BREVET D'INVENTION

MINISTÈRE DE L'INDUSTRIE

P. V. n° 112.715

N° 1.551.885

SERVICE

Classification internationale : C 03 j // D 06 n

de la PROPRIÉTÉ INDUSTRIELLE

Procédé d'obtention de matières microporeuses en hauts polymères et produits obtenus selon ce procédé.

CRYLOR résidant en France (Seine).

Demandé le 30 juin 1967, à 16^h 7^m, à Paris.

Délivré par arrêté du 25 novembre 1968.

*(Bulletin officiel de la Propriété industrielle, n° 1 du 3 janvier 1969.)**(Brevet d'invention dont la délivrance a été ajournée en exécution de l'article 11, § 7, de la loi du 5 juillet 1844 modifiée par la loi du 7 avril 1902.)*

La présente invention se rapporte à un procédé pour la préparation de matières microporeuses à base de hauts polymères. Elle concerne également les produits obtenus selon ce procédé.

Au cours de la présente description, on entend par « matières microporeuses » principalement des films ou pellicules perméables aux gaz et aux vapeurs, d'épaisseur variable suivant le but recherché.

Il est connu d'obtenir des membranes sélectives d'ions à base de différents polymères synthétiques par évaporation du solvant d'un film mis en forme; ou par enduction d'un tissu avec une résine synthétique résistante, puis ionisation de ces membranes. Mais il est souvent difficile d'obtenir, par ces méthodes, des matières microporeuses présentant la porosité désirée.

Les pellicules perméables, notamment à l'air et à la vapeur d'eau, ont récemment acquis une grande importance, en particulier pour la fabrication de la « fleur » dans les produits de remplacement du cuir. Cependant les pellicules en polymères synthétiques employées jusqu'alors n'offrent pas une perméabilité suffisante. On a proposé de mélanger, à des solutions de polymères, des agents porogènes, de transformer ces solutions en pellicules par évaporation des solvants, puis de former des pores par un moyen approprié. Mais les pellicules ainsi préparées comportent généralement des pores visibles, de dimension et de répartition peu uniformes.

On a également proposé de conformer en couches, des solutions de polymères contenant des groupes uréthane dans des solvants hygroscopiques, d'exposer les couches ainsi formées à une atmosphère chargée d'humidité, à température ambiante, puis d'éliminer le solvant résiduel par lavage à l'eau, ou par évaporation. Mais ce procédé est d'un emploi très limité et nécessite l'utilisation de polymères bien déterminés.

On a encore proposé d'immerger la couche de solution de polymère fraîchement formée dans des

bains successifs constitués par des mélanges homogènes de liquides non solvants et solvants du polymère, les bains successifs étant de plus en plus riches en non solvant, et séchage ultérieur à une température pouvant être voisine de 100 °C ou plus basse, ou même à température ordinaire. Mais ce procédé conduit à des pellicules présentant un aspect trop anguleux et une fâcheuse tendance à s'enrouler sur elles-même. De plus, ce procédé ne donne pas de bons résultats avec tous les polymères.

La présente invention résultant des travaux de M. Bernard Blanc, concerne un procédé d'obtention de pellicules microporeuses en hauts polymères comprenant successivement :

La préparation d'un fil mince par mise en forme d'une solution dudit polymère, au moyen d'un procédé connu tel que coulage ou extrudage;

La coagulation du film dans un bain coagulant;

Le lavage à l'eau du film jusqu'à ce qu'il soit substantiellement constitué de polymère et d'eau;

La congélation du film imbibé d'eau, par refroidissement rapide à une température inférieure ou égale à -10 °C;

Le séchage de la matière par préchauffage lent et progressif sous vide du film congelé.

L'invention concerne également les pellicules microporeuses obtenues selon le procédé ci-dessus.

Parmi les polymères utilisables pour la réalisation du procédé selon l'invention on peut citer, comme particulièrement intéressants, les polymères à base d'acrylonitrile, tels que les homopolymères d'acrylonitrile ainsi que les copolymères, mélanges de polymères ou polymères greffés contenant une majeure partie d'unités acrylonitrile et une petite quantité d'unités provenant d'un ou plusieurs monomères éthyléniques copolymérisables avec l'acrylonitrile, tels que les composés vinyliques, chlorure et acétate de vinyle, par exemple, chlorure de vinylidène, acides, esters et amides acryliques ou méthacryliques, méthacrylonitrile, les composés à fonction acide carboxylique, tels que l'acide itaconique, ou

71751h Manufacture of spherical vessels for high pressures from glass-fiber-reinforced plastics. Dobrovolskii, A. K.; Bulanov, I. M.; Dzherelievskii, A. B.; Mulyugina, M. V.; Kalinchev, V. A.; Kuznetsov, V. M.; Shemshurin, M. V.; Trukhina, E. N. (USSR). *Sb. Tr. MTU (Mosk. Vyssh. Tekh. Ucheb.)* 1972, No. 12, 30-8 (Russ.). The technol. of the manuf. of spherical pressure vessels consisting of a glass-fiber-reinforced plastic shell with a hermetic lining was discussed, and the advantages of vacuum polymn. of the resin-impregnated glass fiber winding were presented.

71752j Highly resilient polyvinyl chloride layers. Royalty Designs of Florida, Inc. Brit. 1,331,368 (Cl. B 05c, D 06m, D 21h, B 32b), 26 Sep 1973, US Appl. 60,380, 03 Aug 1970; 5 pp. Fabric-reinforced PVC [9002-86-2], suitable for roofing, was continuously manuf. at $\leq 350^\circ\text{F}$ without molding by heating PVC contg. 4-5 wt. parts plasticizer: 1 wt. part resin to a gel at 240°F , to a liq. at $300-30^\circ\text{F}$, and extruding the liq. at $\sim 350^\circ\text{F}$ onto a cool moving fabric sheet. The plastic penetrated the fabric and was smoothed off by a doctor blade. A duck-type canvas was penetrated by PVC contg. a mixt. of $\sim 60\%$ phosphate and $\sim 40\%$ phthalate plasticizer after a few sec. The resilient roofing formed was resistant to burning at 1300°F .

71753k Striped plastic laminates. Edwards, Joseph Lewis (B. M. Coatings Ltd.) Brit. 1,331,954 (Cl. B 32b), 26 Sep 1973, Appl. 53,323/70, 10 Nov 1970; 3 pp. Narrow bands of PVC [9002-86-2] were applied to the tacky surface of a PVC-coated fabric and the laminate patterned and its surface rendered flush by passage between a hard engraved roller and a soft roller. Thus, a 2.5 oz 40/40 plain weave 210 denier nylon yarn cloth was coated with PVC and 2 in. wide 4 mil thick bands applied at 4 in. centers. Rolling gave a plane-faced 10 oz/yd² 15 mil thick product suitable for safety clothing.

71754m Treatment of plastic films. Shimizu, Kazuo (Mitsubishi Paper Mills, Ltd.) Japan. 72 40,864 (Cl. B 29cc), 16 Oct 1972, Appl. 69 75,825, 25 Sep 1969; 2 pp. Plastic films were made suitable for writing and printing without coating by soaking in a swelling agent contg. a mat agent and exposing to supersonic radiations. Thus, poly(ethylene terephthalate) [25038-59-9] film was soaked in a dispersion of *o*-chlorophenol [95-57-8] and chamotte at 53° , exposed to supersonic radiation (15 kcal) for 30 min, treated with a soln. of polyethylene glycol in iso-PrOH, and dried to give a film suitable for writing.

71755n Stabilizing molded high-molecular-weight thermo-plastic polycarbonates. Cohnen, Wolfgang; Peilstoecker, Guenter (Bayer A.-G.) Ger. Offen. 2,211,641 (Cl. C 05g), 20 Sep 1973, Appl. P 22 11 641.2-43, 10 Mar 1972; 20 pp. The title polycarbonate moldings were stabilized against uv light by treatment of the molding in a soln. of 1,2-dichloroethane (I) [107-06-2] and (or) 1,1,2-trichloroethane [79-00-5] 10-80, isopropanol [67-63-0], ethanol [64-17-5], 2-chloroethanol [107-07-3], or propanol [71-23-5] 20-80, and water 0-25 parts contg. a uv absorber at room temp. and drying at $70-100^\circ$. Thus, an extruded bisphenol A polycarbonate [25037-45-0] of relative viscosity 1320 (0.5 mg/100 ml CH₂Cl₂) was dipped 30 sec. in a 47.5:30.0:22.5 iso-PrOH-I-water mixt. contg. 3.5% 2-hydroxy-4-methoxybenzophenone, dried in air at room temp. until about half the mixt. evapd. and heated 20 min at 90° to give a sample which did not lose its impact resistance in a 5000-hr aging 7 cm from a 250 W Hg vapor lamp at 65% relative humidity.

71756p Unsaturated polyester resin compositions for flexible moldings. Chiba, Fumio; Sato, Morimasa; Fujii, Tadashi (Hitachi Chemical Co., Ltd.) Japan. Kokai 73 52,888 (Cl. 26(3)C51), 25 Jul 1973, Appl. 71 87,654, 05 Nov 1971; 3 pp. Flexible rubber-like moldings were manuf. from polymers of styrene with polyesters prep. by treating mixts. of unsatd. dicarboxylic acids, aliph. dicarboxylic acids, and 1,2,3,6-tetrahydrophthalic acid or methyl-1,2,3,6-tetrahydrophthalic acid [27636-35-7] with polyhydric alcs. Thus, a rubber-like molding was made from adipic acid-dithylene glycol-fumaric acid-styrene-1,2,3,6-tetrahydrophthalic anhydride polymer [50601-55-3] prep. by molding a mixt. contg. 31 parts styrene and 69 parts polyester produced by heating at $150-220^\circ$ adipic acid 0.25, dithylene glycol 1.1, fumaric acid 0.25, and 1,2,3,6-tetrahydrophthalic anhydride 0.5 moles. H. Kuroe.

71757q Phosphate-coated laminates. Doi, Kazuo; Murakami, Takeshi; Takaishi, Katsutoshi (Matsushita Electric Works, Ltd.) Japan. 73 01,959 (Cl. B 32b), 13 Feb 1973, Appl. 70 3420, 12 Jan 1970; 4 pp. Powd. CaCO₃ was sprayed onto a mat surface, e.g. fiber-reinforced polyesters, pressed at 80° and 2 kg/cm², the mats stacked, pressed at 160° , treated with HCl to decompose remaining CaCO₃, sprayed with a mixt. of aluminum hydrogen phosphate [13530-54-6], calcium hydrogen phosphate [7757-93-9], and magnesium dihydrogen phosphate [13092-66-5], and cured at 120° to give a weather resistant laminate.

71758r Air permeable sheet materials. Tada, Kohichi (Teyo Rubber Industry Co., Ltd.) Japan. 72 38,553 (Cl. C 08j), 30 Sep 1972, Appl. 67 51,703, 11 Aug 1967; 3 pp.

Air-permeable polymer sheets were prep. by dissolving the polymer in an org. solvent, applying the soln. to a base, or impregnating the base material, freezing, and removing the frozen solvent by reduced pressure sublimation. Thus, *Tenn 450 A* [50612-05-2], a polyurethane elastomer, in 20% soln. in PhOH, was coated on a glass plate and cooled to 2° to solidify; the PhOH, which was removed by reducing the pressure to 0.5 mm, the sheet, after removal from the glass and washing with MeOH, had a thickness of 0.35 mm, apparent d. of 0.65 g/cm³, breaking elongation of 350%, and humidity permeability of 1400 g H₂O/24 hrs/m² at 40° . For a sheet prep. from a 5% soln. in PhOH, the values were 0.75, 0.25, 260, and 2400.

71759s Polystyrene foamed structural member. Asakura, Hiroshi; Takano, Kohshi; Kusaka, Masaharu; Niibu, Hiroshi; Ikeda, Hidetoshi; Taniguchi, Hirohide; Takahashi, Yasushi (Toyo Chemical Co., Ltd.; Denki Kagaku Kogyo K. K.) Japan. 73 05,101 (Cl. B 29df, B 32b), 14 Feb 1973, Appl. 70 44,409, 22 May 1970; 5 pp. Polystyrenes (I) [9003-53-6] having 2 different foaming ratios contg. glass or metal fiber reinforcement were used to manuf. closed cell foamed structural members. I which expanded 1.2-2.0 times was used as the low foaming component, and I which expanded 2.5-10.0 times was used as the medium foaming component. The I components were extruded to form a structural member having medium foamed I as the inner core and low foamed I as the outer shell, both contg. reinforcing fibers.

71760k Multilayer foamed structural member. Asakura, Hiroshi; Takano, Kohshi; Kusaka, Masaharu; Niibu, Hiroshi; Ikeda, Hidetoshi; Taniguchi, Hirohide; Takahashi, Yasushi (Toyo Chemical Co., Ltd.; Denki Kagaku Kogyo K. K.) Japan. 73 05,100 (Cl. B 29df, B 32b), 14 Feb 1973, Appl. 70 42,754, 19 May 1970; 4 pp. Polystyrene (I) [9003-53-6] having low and high foaming ratios were extruded continuously while feeding reinforcing material into the extruder to give a structural member having a high-foamed I inner core and an outer shell of low-foamed I.

71761m Electrically insulating sheets. Murata, Tatsu; Tsubouchi, Haruyoshi; Tamura, Tadashi; Noguchi, Ikuo (Nihon Bairin Co., Ltd.) Japan. Kokai 73 83,399 (Cl. 62 C52, 59 E101.3, 60 C024), 07 Nov 1973, Appl. 72 15,234, 15 Feb 1972; 6 pp. A fiber web of 10-60 wt. % polyolefin fibers or powder and 40-90% polyester fibers is pressed in the presence of water at the m.p. of the polyolefin, degreased if needed, coated with cellulose ester or polycarbonate to 5-30 wt. % solids pickup to give a elec. insulating sheet with low dielec. loss and good resistance to high voltage and oil. Thus, a 75 g/m² fiber web of 30 wt. % 2-denier \times 51- μ m polypropylene fibers and 70 wt. % 1.25-denier \times 38- μ m polyester fibers was wetted with water and calendered at 205° and 410 kg/cm. The sheet was treated with Triclene to remove impurities and coated twice with cellulose acetate butyrate acetone soln. to 25% solids pickup. The sheet had dielec. tangent 0.050% at 60 Hz and 80° and breakdown voltage 78 kV/mm and retained >95% of its original tensile strength after immersing 3000 hr in alkylbenzene at 100° . When the degreasing process was omitted, a similar sheet had dielec. tangent 3.2%.

71762n Annealing of polyacetal resin moldings. Ikeguchi, Mitsuwaki; Fujimoto, Kenichi; Yamashita, Osamu (Nippon Steel Chemical Industry Co., Ltd.) Japan. Kokai 73 83,176 (Cl. 25(5)K5), 06 Nov 1973, Appl. 72 14,343, 12 Feb 1972; 4 pp. A polyacetal molding is annealed in a liq. (room temp.) b. $240-400^\circ$ and having sp. dispersion 150-260 excluding condensed arom. compds. Thus, an injection molded $6 \times 10 \times 120$ -mm poly(oxyethylene)-ethylene oxide copolymer plate was annealed 30 min at 150° in Santotherm 66 (b. $333-90^\circ$, sp. dispersion 193 by JIS C 2102-66) to improve the impact strength (ASTM D 256) and heat-distortion temp. (ASTM D 648) from 7.28 to 9.92 kg-cm²/cm² and from 94.9 to 105° , resp.

71763p Abrasion-resistant leather substitute. Chiku, Takeo; Ninomiya, Kiyoshi; Suzuki, Shoichi; Kogiso, Takeshi (Toyota Central Research and Development Laboratories Inc.) Japan. Kokai 73 85,703 (Cl. 27 E23), 13 Nov 1973, Appl. 72 16,171, 15 Feb 1972; 4 pp. A polyamide soln. in lower alc. contg. metal salt is mixed with carbon black, alumina powder, and (or) silica powder and Fe oxide powder, and the mixt. is applied to a substrate textile, coagulated in water, washed, and dried to give a leather substitute with good abrasion resistance. Thus, a mixt. of satd. CaCl₂ soln. in MeOH 1000, nylon 66 250, a carbamate ester 25, ~ 14 μ m carbon black 2.5, and 1-2 μ red Fe oxide 5 g was ball-milled 18 hr, applied to a napped textile to ~ 0.2 mm, left 5 min at 50° , immersed 5 min in water to coagulate, washed ~ 40 min in water, and dried 15 min at 80° . The leather substitute had abrasion 18 mg and moisture permeability (JIS K 6549) 11.7 mg/cm²-hr, compared with 30 mg and 11.3 mg/cm² hr, resp. for a similar sheet without red Fe oxide.

71764q Mixing head for reactive synthetic resin components, especially polyurethane. Faerber, Gerd (Krauss-Maffei A.-G.) Ger. Offen. 2,212,343 (Cl. C 03g), 18 Oct 1973, Appl. P 22 12 343.9, 15 Mar 1972; 12 pp. A mixing head is described which prevents backflow of the mixt. into the inlet ports.

**PATENT COOPERATION TREATY
INTERNATIONAL SEARCH REPORT**

IDENTIFICATION OF INTERNATIONAL APPLICATION	
International Application No. ¹	International Filing Date ¹ 17 June 1971
Receiving Office ¹	Priority Date Claimed ² 17 June 1970
Applicant ¹	

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ³
According to International Patent Classification (IPC) or to both National Classification and IPC Int. Cl.: G 01 J 3/00

II. FIELDS SEARCHED	
Minimum Documentation Searched ⁴	
Classification System	Classification Symbols
Int. Cl.:	G 01 J 3/00, G 01 J 3/12, G 01 J 3/06, G 01 J 3/42
Patent Documentation Searched other than Minimum Documentation ⁵	
DT 1877 - 1920	BE from 1926 on
FR 1902 - 1920	LU from 1946 on
GB 1909 - 1920	NL from 1912 on

III. TITLE, ABSTRACT AND FIGURE OF DRAWING
1. The following indicated items are approved as submitted by the applicant: ⁶ <input type="checkbox"/> Title. <input type="checkbox"/> Abstract.
2. The texts established by this International Searching Authority of the following indicated items are set forth on a supplemental sheet: ⁶ <input type="checkbox"/> Title. <input type="checkbox"/> Abstract.
3. <input type="checkbox"/> This report is incomplete as far as the abstract is concerned as the time limit for comments by the applicant on the draft prepared by this International Searching Authority has not expired. ⁷
4. The figure of the drawings indicated below is to be published with the abstract: ⁸ <input type="checkbox"/> Figure No. _____ as suggested by the applicant. ⁹ Figure No. _____ because: <input type="checkbox"/> applicant failed to suggest a figure. ¹⁰ <input type="checkbox"/> this figure better characterizes the invention. ¹⁰

IV. UNITY OF INVENTION IS LACKING ¹¹ (Observations on supplemental sheet)

V. CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹² (Observations on supplemental sheet)

IV. <input type="checkbox"/> OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ¹¹	Page ...
1. Additional fees were paid by the applicant. Consequently, the international search covers:	
a. <input type="checkbox"/> all parts of the international application.	
b. <input type="checkbox"/> those parts of the international application covered by claims Nos. _____	
2. <input type="checkbox"/> The additional fees were paid under protest. Where requested by the applicant, the text of the protest together with the decision taken thereon are annexed to this report.	
3. <input type="checkbox"/> No additional fees were timely paid by the applicant. Consequently, the international search is restricted to the invention first mentioned ("main invention") only; it is covered by claims Nos. _____	

V. <input type="checkbox"/> OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹²
This international search report has not been established in respect of claims Nos. _____ for the following reasons:
1. <input type="checkbox"/> Claims Nos. _____ because their subject matter ¹³ relates to _____
2. <input type="checkbox"/> Claims Nos. _____ because they do not comply with the prescribed requirements to such an extent that a meaningful search could be carried out ¹⁴ (specify)

NOTES TO FORM PCT/ISA/210

These Notes are intended to facilitate the use of the present form. For full information, see the text of the Patent Cooperation Treaty and the texts of the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and the said texts, the latter are applicable. "Article" refers to Articles of the Treaty, "Rule" refers to Rules of the Regulations and "Section" refers to Sections of the Administrative Instructions.

- 1 "The international search report shall identify the International Searching Authority which established it by indicating the name of such Authority, and the international application by indicating the international application number, the name of the applicant, the name of the receiving Office, and the international filing date." (Rule 43.1)
- 2 "The international search report shall be dated and shall indicate the date on which the international search was actually completed. It shall also indicate the filing date of any earlier application whose priority is claimed." (Rule 43.2)
- 3 "The international search report shall contain the classification of the subject matter at least according to the International Patent Classification." (Rule 43.3 (a))
"Such classification shall be effected by the International Searching Authority." (Rule 43.3 (b))
"Where the subject matter of the international application must be provided with different classification symbols according to the principles to be followed in the application of the International Patent Classification to any given patent document, the international search report shall indicate all such symbols." (Section 504 (a))
"Where any national classification system is used, the international search report may indicate all the applicable classification symbols also according to that system." (Section 504 (b))
"Where the subject matter of the international application is classified both according to the International Patent Classification and to any national classification system, the international search report shall indicate the corresponding symbols of both classifications opposite each other." (Section 504 (c))
- 4 "The international search report shall list the classification identification of the fields searched. If that identification is effected on the basis of a classification other than the International Patent Classification, the International Searching Authority shall publish the classification used." (Rule 43.6 (a))
- 5 "If the international search extended to patents, inventor's certificates, utility certificates, utility models, patents or certificates of addition, inventor's certificates of addition or published applications for any of those kinds of protection, of States, periods, or languages, not included in the minimum documentation as defined in Rule 34, the international search report shall, when practicable, identify the kinds of documents, the States, the periods, and the languages to which it extended. For the purpose of this paragraph, Article 2 (ii) shall not apply." (Rule 43.6 (b))
- 6 "Subject to paragraphs (b) and (c), the international search report shall either state that the International Searching Authority approves the title and the abstract as submitted by the applicant or be accompanied by the text of the title and/or abstract as established by the International Searching Authority under Rules 37 and 38." (Rule 44.2 (a))
- 7 "If, at the time the international search is completed, the time limit allowed for the applicant to comment on any suggestion of the International Searching Authority in respect of the abstract has not expired, the international search report shall indicate that it is incomplete as far as the abstract is concerned." (Rule 44.2 (b))
- 8 "Where it is the International Searching Authority which, under Rule 8.2, indicates the figure or figures of the drawings to be published with the abstract, that Authority shall notify the applicant and the International Bureau accordingly." (Section 507)
- 9 The figure suggested by the applicant is indicated in the check list of the request; see Rule 3.3 (a) (iii).
- 10 "If the applicant fails to make the indication referred to in Rule 3.3 (a) (iii), or if the International Searching Authority finds that a figure or figures other than that figure or those figures suggested by the applicant would among all the figures of all the drawings, better characterize the invention, it shall indicate the figure or figures which it so considers. Publication by the International Bureau shall then use the figure or figures so indicated by the International Searching Authority. Otherwise, the figure or figures suggested by the applicant shall be used in the said publications." (Rule 8.2)
- 11 This part of the report is filled in only where, in the course of the procedure preceding the issuance of this report the International Searching Authority, having found that the international application does not comply with the requirement of unity of invention, invites the applicant to pay additional fees (see Article 17 (3) (a))
"If the applicant paid additional fees for the international search, the international search report shall so indicate. Furthermore, where the international search was made on the main invention only (Article 17 (3) (a)), the international search report shall indicate what parts of the international application were and what parts were not searched." (Rule 43.7)
- 12 This part of the report is filled in only where Article 17 (2) (b) applies. (Where certain claims were not searched because of lack of unity of invention and non-payment of additional fees, part IV—rather than this part—is filled in.) Article 17 (2) reads as follows:
"(a) If the International Searching Authority considers
(i) that the international application relates to a subject matter which the International Searching Authority is not required, under the Regulations, to search, and in the particular case decides not to search, or
(ii) that the description, the claims, or the drawings, fail to comply with the prescribed requirements to such an extent that a meaningful search could not be carried out,
the said Authority shall so declare and shall notify the applicant and the International Bureau that no international search report will be established.
"(b) If any of the situations referred to in subparagraph (a) is found to exist in connection with certain claims only, the international search report shall so indicate in respect of such claims, whereas, for the other claims, the said report shall be established as provided in Article 18."
- 13 See Article 17 (2) (a) (i), quoted in note 12, above, and Rule 39 reading as follows:
"No International Searching Authority shall be required to search an international application if, and to the extent to which, its subject matter is any of the following:
(i) scientific and mathematical theories,
(ii) plant or animal varieties or essentially biological processes for the production of plants and animals, other than microbiological processes and the products of such processes,
(iii) schemes, rules or methods of doing business, performing purely mental acts or playing games,
(iv) methods of treatment of the human or animal body by surgery or therapy, as well as diagnostic methods,
(v) mere presentations of information,
(vi) computer programs to the extent that the International Searching Authority is not equipped to search prior art concerning such programs."
- 14 See Article 17 (2) (a) (ii), quoted in note 12, above.
- 15 "The objective of the international search is to discover relevant prior art." (Article 15 (2))
Rule 33.1, entitled "Relevant Prior Art for International Search," reads as follows:
"(a) For the purposes of Article 15 (2), relevant prior art shall consist of everything which has been made available to the public anywhere in the world by means of written disclosure (including drawings and other illustrations) and which is capable of being of assistance in determining that the claimed invention is or is not new and that it does or does not involve an inventive step (i.e., that it is or is not obvious), provided that the making available to the public occurred prior to the international filing date.
"(b) When any written disclosure refers to an oral disclosure, use, exhibition, or other means whereby the contents of the written disclosure were made available to the public, and such making available to the public occurred on a date prior to the international filing date, the international search report shall separately mention that fact and the date on which it occurred if the making available to the public of the written disclosure occurred on a date posterior to the international filing date.
"(c) Any published application or any patent whose publication date is later but whose filing date or, where applicable, claimed priority date, is earlier than the international filing date of the international application searched, and which would constitute relevant prior art for the purposes of Article 15 (2) had it been published prior to the international filing date, shall be specially mentioned in the international search report."
- 16 "Where any document cited in the international search report is of particular relevance, the special indication required by Rule 43.5 (c) shall consist of the "X" placed next to the citation of the said document." (Section 505)
"Where any document cited in the international search report refers to an oral disclosure, use, exhibition, or other means referred to in Rule 33.1 (b), the separate indication required by that Rule shall consist of the letter "O" placed next to the citation of the said document." (Section 508 (a))
"Where any document cited in the international search report is a published application or patent as defined in Rule 33.1 (c), the special mention required by that Rule shall consist of the letter "E" placed next to the citation of the said document." (Section 508 (b))
"Where any document cited in the international search report is a document which defines the general state of the art, it shall be

indicated by the letter "G" placed next to the citation of the said document." (Section 508 (c))

"Where any document cited in the international search report is a document whose publication date occurred earlier than the international filing date of the international application, but later than the priority date claimed in that application, it shall be indicated by the letter "P" next to the citation of the said document." (Section 508 (d))

17 "The international search report shall contain the citations of the documents considered to be relevant." (Rule 43.5 (a))

"Identification of any document cited in the international search report referred to in Rule 43.5 (b) shall be made by indicating the following elements in the order in which they are listed:

(a) *In the case of any patent document* (patent documents being patents within the meaning of Article 2 (ii) as well as published applications relating thereto)

- (i) the Office that issued the document, by the two-letter code as in *Annex B*;
- (ii) the kind of document, by the appropriate symbols as in *Annex C*;
- (iii) the number of the document as given to it by the Office that issued it;
- (iv) the date of publication as indicated on the patent document; and
- (v) where applicable, the pages, columns or lines where the relevant passages appear, or the relevant figures of the drawings.

(b) *In the case of any book or other separately issued publication*

- (i) the name of the author;
- (ii) the title (including, where applicable, the number of the edition and/or volume);
- (iii) the year, month and day of publication (where only less precise data appears on the book or other separately issued publication, such as the year and month, or only the year, then only such data as appear thereon need be indicated unless the complete data are readily available from an authoritative source);
- (iv) the name of the publisher;
- (v) the place of publication (where only the location of the publisher appears on the book or other separately issued publication, then that location shall be indicated as the place of publication); and
- (vi) where applicable, the pages, columns or lines where the relevant passages appear, or the relevant figures of the drawings.

(c) *In the case of any article published in a periodical or other serial publication*

- (i) the title of the periodical or other serial publication;
- (ii) the number of the volume and the date of the issue in which the article appears;

(iii) the place of publication (where only the location of the publisher appears in the periodical or other serial publication, then that location shall be indicated as the place of publication);

(iv) the author and the title of the article and the number of the page both on which the article starts and ends; and

(v) where applicable, the pages, columns or lines where the relevant passages appear, or the relevant figures of the drawings.

(d) *In the case of abstracts*

(i) the identification of the document containing the abstract in the manner set forth in paragraph (a), (b) or (c), respectively, depending upon whether the abstract is contained in a patent document, in a book or other separately issued publication, or in an article published in a periodical or other serial publication;

(ii) in the case where the abstract is not published together with the full text document which served as its basis, the identification of the full text document on the basis of whatever bibliographic data may be available in respect thereto." (Section 503)

18 "If only certain passages of a cited document are relevant or particularly relevant, they shall be identified, for example, by indicating the page, column, or the lines, where the passage appears." (Rule 43.5 (e))

19 "Citations which are not relevant to all the claims shall be cited in relation to the claim or claims to which they are related." (Rule 43.5 (d))

"The manner of indicating the claims to which cited documents are relevant shall be indicated by placing in the appropriate column of the international search report:

(i) where the cited document is relevant to one claim, the number of that claim; for example (2) or (17),

(ii) where the cited document is relevant to two or more claims numbered in consecutive order, the numbers of the first and last claims of the series connected by a hyphen; for example, (1-15) or (2-3),

(iii) where the cited document is relevant to one or more claims that are not numbered in consecutive order, the number of each claim placed in ascending order and separated by a comma or commas; for example, (1,6) or (1,7,10),

(iv) where the cited document is relevant to more than one series of claims under (ii) above, or to claims of both categories (ii) and (iii) above, the series or individual claim numbers and series placed in ascending order using commas to separate the several series, or to separate the numbers of individual claims and each series of claims; for example, (1-6, 9-10, 12-15) or (1, 3-4, 6, 9-11)." (Section 509)

20 "The international search report shall be signed by an authorized officer of the International Searching Authority." Rule 43.8)

Acousto-Optic Tunable Filter*

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(Received 14 September 1968)

This paper proposes a new type of electronically tunable optical filter. The basic idea is to utilize collinear acousto-optic diffraction in an optically anisotropic media. Changing the driving acoustic frequency changes the band of optical frequencies that the filter passes. A LiNbO₃ acousto-optic filter with a pass band approximately 1.3 cm⁻¹ wide should be tunable from 4000 to 7000 Å by changing the acoustic frequency from 428 to 990 Mc/sec. For this case, the angular aperture will be about 1.5°, and, theoretically 100% transmittance should be attained at the filter center frequency by use of about 14 mW of acoustic power per mm² of filter aperture.

INDEX HEADINGS: Filter; Polarization; Monochromators; Birefringence; Electro-optics.

In this paper, we propose a new type of electronically tunable optical filter. The basic idea is to utilize collinear acousto-optic diffraction in an optically anisotropic medium.¹ When an acoustic wave travels in a solid or liquid, the strain-induced change of the refractive index of the medium may diffract a light beam that is incident on the medium. In an isotropic medium, the polarization of the diffracted light is unchanged and the diffraction is particularly strong when the light is incident at the Bragg angle.² In an anisotropic medium, for certain crystal orientations, light may be diffracted from one polarization to another.¹ In this case, the condition for particularly strong interaction between the acoustic wave and the light wave is that the sum of the \vec{k} vectors of the incident light and the acoustic wave equal the \vec{k} vector of the orthogonally polarized diffracted wave.³

In the acousto-optic filter proposed here, a crystal orientation is chosen such that an incident optical signal of one polarization is diffracted into the orthogonal polarization by a collinearly propagating acoustic beam. For a given acoustic frequency, only a small range of optical frequencies will satisfy the \vec{k} vector-matching condition, and only this small range of frequencies will be cumulatively diffracted into the orthogonal polarization. If the acoustic frequency is changed, the band of optical frequencies which the filter will pass is changed.

A LiNbO₃ acousto-optic filter will be shown to have a pass band approximately 1.3 cm wide, which is tunable from 4000 Å to 7000 Å by changing the acoustic frequency from 428 Mc/sec to 990 Mc/sec. For this case, the angular aperture will be about 1.5°, and theoretically, 100% transmittance at the filter center frequency should be obtained with 14 mW of propagating acoustic power per mm² of filter aperture.

ANALYSIS

The proposed acousto-optic filter consists of an input polarizer, a crystal with an appropriate acoustic transducer, and an output polarizer. A number of different crystal orientations, involving either longitudinal or shear waves, would allow collinear diffraction of light into the orthogonal polarization. One possible configuration for the filter using LiNbO₃ is shown in Fig. 1. In this case, the acoustic wave is brought in as a longitudinal wave, which is then converted to a shear wave upon reflection at the input face of the crystal.⁴ The acoustic shear wave and the input optical beam then propagate collinearly down the y axis of the crystal, along which the acousto-optic interaction takes place.

We take the input optical beam to be an extraordinary wave polarized along the z or optic axis of the crystal. The output or diffracted optical beam will be an ordinary wave polarized along the x axis of the crystal. The acoustic wave that is necessary to accomplish the diffraction into the orthogonal polarization is an S_6 shear wave, and is set up in the configuration of Fig. 1. The three waves are then taken as plane waves and are given by

$$\hat{E}_z(y,t) = [E_z(y)/2] \exp j(\omega_0 t - k_0 y) + c.c.$$

(input optical wave)

$$\hat{E}_x(y,t) = [E_x(y)/2] \exp j(\omega_0 t - k_0 y) + c.c. \quad (1)$$

(output optical wave)

$$\hat{S}_6(y,t) = [S_6(y)/2] \exp j(\omega_s t - k_s y) + c.c.$$

(acoustic shear wave)

The quantities ω_i , ω_0 , ω_s ; and k_i , k_0 , k_s are the angular frequencies and \vec{k} vectors of the input optical wave, output optical wave, and acoustic wave, respectively. The symbol $\hat{}$ denotes variables which have the complete time and spacial dependence, as opposed to the envelope variables $E_x(y)$, etc. The acoustic wave mixes

* The work reported here was sponsored by the National Aeronautics and Space Administration under Grant NGR-05-020-103.

¹ R. W. Dixon, IEEE J. Quant. Elect. QE-3, 85 (1967).

² M. Born and E. Wolf, *Principles of Optics* (Pergamon Press, Inc., New York, 1964), p. 593-609.

³ In fact, the Bragg condition is a special case of \vec{k} vector matching and is strictly correct only when the acoustic frequency is negligibly small as compared with the optical frequency.

⁴ E. G. H. Lean and H. J. Shaw, Appl. Phys. Letters 9, 372 (1966).

United States Patent Office

3,447,876

Patented June 3, 1969

1

3,447,876

APPARATUS FOR DETECTING
MONATOMIC VAPOURSAnthony Rene Barringer, Willowdale, Ontario, Canada,
assignor to Barringer Research Limited, Rexdale, On-
tario, Canada, a corporation

Filed Oct. 11, 1965, Ser. No. 494,552

Int. Cl. G01j 3/50, 3/44; G01n 21/26

U.S. Cl. 356—188

6 Claims

ABSTRACT OF THE DISCLOSURE

A spectrometer for measuring monatomic vapours. Light from a lamp is first transmitted through a chamber containing a sample of a vapour to be measured, then through a first resonance radiation cell containing the same vapour, and finally, after passing through the first resonance radiation cell, the light is passed through a second resonance radiation cell containing an isotope of the same vapour, the isotope having an absorption line that is closely adjacent to a predetermined absorption line of the vapour. First and second photosensitive detectors are provided for respectively detecting the level of resonance radiation produced in the first and second resonance radiation cells, and circuit means is provided for indicating the degree of unbalance between the output of the first and second detectors.

This invention relates to a method and apparatus for detecting minute traces of substances, and in particular to a spectrophotometer that can be used for both terrestrial spectrophotometric analysis and the analysis of planetary atmospheres.

Spectrophotometric analysis is a method of chemical analysis based upon the absorption of electromagnetic energy at specific wavelengths by atoms or molecules of a substance. A problem with spectrophotometers has been the presence of interfering substances which absorb broadly in the region of the spectrum containing the absorption line or lines of the substance under analysis. The spectrophotometer disclosed herein employs a novel reference against which the absorption by the substance can be compared. The wavelength of the reference is very close to the wavelength of the absorption line of the substance so that interfering substances in general absorb equally at the reference wavelength and at the absorption wavelength.

According to one aspect, the invention consists of a method of detecting the presence of a monatomic vapour of an element in a region, the region being irradiated with light containing energy at the wavelength of an absorption line of the element, the light emerging from the region being deficient in energy at the absorption wavelength when the vapour is present, the method comprising, shining the emergent light through a first resonance radiation cell containing said monatomic vapour of the element and observing the intensity of the resonance re-radiation produced thereby, shining the emergent light through a second resonance radiation cell containing another vapour having an absorption line that is adjacent to the absorption line of the element, and observing the intensity of the resonance re-radiation pro-

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duced thereby, and comparing the intensities of the resonance re-radiation produced in the first and second resonance radiation cells.

According to another aspect, the invention consists of an apparatus for detecting the presence of a monatomic vapour of an element in a region, the region being irradiated with light containing energy at the wavelength of an absorption line of the element, the light emerging from the region being deficient in energy at the absorption wavelength when the vapour is present, the apparatus comprising, a first resonance radiation cell through which the emergent light is transmitted, the first resonance radiation cell containing said monatomic vapour of the element, a detector for measuring the intensity of resonance re-radiation produced in the first resonance radiation cell, a second resonance radiation cell through which the emergent light is transmitted, the second resonance radiation cell containing another vapour having an absorption line that is adjacent to the absorption line of the element, a second detector for measuring the intensity of resonance re-radiation produced in the second resonance radiation cell, and means for differentially comparing the intensities of the resonance re-radiation produced in the first and second resonance radiation cells. The respective vapours present in the first and second resonance radiation cells are preferably different isotopes of the same element, and their respective absorption wavelengths are very nearly equal. The outputs of the two detectors are initially balanced. If one of the isotopes is present in the region, the output of the two detectors becomes unbalanced, and the degree of unbalance is proportional to the number of absorbing atoms present in the region. If both isotopes are present in the region, the output of the two detectors is again unbalanced provided that the isotope ratio is not unity.

Objects of the invention are to provide a spectrophotometer that is sensitive, accurate and relatively free from interferences.

Preferred embodiments of the invention are illustrated in the accompanying drawings, wherein:

FIG. 1 is a block diagram of a simplified form of the invention, and

FIG. 2 is a block diagram of a spectrophotometer that is adapted to analyze the atmospheres of planets from a spacecraft.

Referring to FIG. 1, a broadband, collimated light source 10 provides a luminous continuum which is directed through a sample cell 11. The light source 10 can be a black body radiator such as an incandescent lamp, a natural source such as the sun, or any other continuum source which can be collimated and directed through the sample cell 11. The sample cell 11 is closed at both ends by transparent vapour-proof windows 11a, for example of quartz. The vapour to be analyzed can be pumped through the sample cell 11 via an inlet 12 and an outlet 13.

After the light passes through the sample cell 11, it is directed through an interference filter 14 and then through successive resonance radiation cells 15a and 15b respectively. The interference filter 14 has a narrow bandwidth, e.g. of the order of a few angstroms or less, and is centered at the wavelength of an absorption line of the

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BUNDESREPUBLIK DEUTSCHLAND

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Annex II
3rd citation
page 23

DEUTSCHES PATENTAMT



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Land:

V. St. v. Amerika

18

Aktenzeichen:

820873

19

Bezeichnung:

Abstimmbares optisches Filter

20

Zusatz zu: —

21

Ausscheidung aus: —

22

Anmelder:

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Vertreter:

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23

Als Erfinder benannt:

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Benachrichtigung gemäß Art. 7 § 1 Abs. 2 Nr. 1 d. Ges. v. 4. 9. 1967 (BGBl. I S. 960): —

United States Patent Office

3,308,712

Patented Mar. 14, 1967

1

3,308,712

TRANSDUCER FOR SPECTRUM ANALYSIS
APPLICABLE TO CLOSED LOOP CONTROLRonald H. Kay, Los Gatos, Calif., assignor to International Business Machines Corporation, New York, N.Y.,
a corporation of New York

Filed Nov. 6, 1963, Ser. No. 321,916

8 Claims. (Cl. 88-14)

This invention relates to transducers and more particularly to transducers responsive to absorption or emission spectra.

The art of spectrum analysis is well developed and many highly sophisticated devices are known for detecting absorption and emission spectra. However, the known devices are not particularly well suited where a rapid scan of the spectrum is desired nor are present devices well suited as transducers in automatic process control systems. The present invention is directed to a spectrometer which is particularly suited for application as a transducer in an automatic process control system.

An object of the present invention is to provide an improved transducer which is responsive to absorption or emission spectra.

A further object of the present invention is to provide an improved spectrometer.

A still further object of the present invention is to provide a simple and rugged spectrometer.

Yet another object of the present invention is to provide a device for continually sensing the absorption spectrum of a sample.

Yet another object of the present invention is to provide a spectrometer which is particularly suited for use as a transducer in a process control system.

A still further object of the present invention is to provide a device which can rapidly scan the absorption spectrum of a sample.

Yet another object is to provide a device which can rapidly scan the emission spectrum of a sample.

The transducer of the present invention includes a polychromatic light source, a dynamic filter, and a detector. The dynamic filter only allows light of one frequency to pass, the particular frequency which is allowed to pass varies as a function of time. When used as an absorption spectrometer the light which passes through the dynamic filter is directed through a sample and then to a detector. The detector produces a signal which represent the absorption spectrum of the sample. When used to detect the emission spectra of the sample, the light source is replaced by the luminous sample and the light from the sample is directed through the dynamic filter to the detector.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawings.

FIGURE 1 shows a preferred embodiment of the invention.

FIGURE 2 shows the light which passes through the dynamic filter.

FIGURE 3 shows the operation of the wedge interference filter.

FIGURE 4 shows the function of the compensating mask.

FIGURE 5 shows an alternate embodiment.

The embodiment shown in FIGURE 1 detects the absorption spectrum of a sample. It includes a polychromatic light source 1, a dynamic filter 3, a sample which is to be analyzed 5, a light detector 7, and an output circuit 8. The filtering action of dynamic filter 3 is a function of time, as shown in FIGURE 2. In the normal state, no

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light passes through the filter as shown between the times designated "0" and "a" in FIGURE 2. After a start signal is applied to the filter (in a manner which will be explained in detail later) light of a particular frequency passes through the filter and as time progresses the frequency of the light which passes through the filter changes, as shown in FIGURE 2. After a time designated "b" in FIGURE 2, no light passes through the filter.

Thus, light of varying frequency is directed at the sample 5. Depending upon the characteristics of sample 5, certain frequencies of the light are absorbed and certain frequencies are not absorbed. Detector 7 naturally only observes light of those frequencies which are not absorbed, therefore giving an indication of the absorption spectrum of sample 5.

Dynamic filter 3 includes collimating lens 12, sonic delay line 14, wedge interference filter 18, compensating mask 20, condensing lens 22, and mask 24. Sonic delay line 14 includes a piezoelectric driver 16 which can be activated from terminal 17. When piezoelectric driver 16 is activated a pulse propagates from the end of delay line 14 which is designated 14a, to the end of delay line 14 which is designated 14b. A pulse designated 15 is diagrammatically illustrated in FIGURE 1. Light normally passes directly through delay line 14; however, at points where a pulse is located (for example, pulse 15) the light is refracted. This is a well known phenomena. For example, see Ultrasonics by Bensen Carlin, McGraw-Hill Book Company (1949), or U.S. Patent 2,418,964 by D. L. Arenberg.

Wedge interference filter 18 is a conventional device well known in the art. For example, see University Physics Series, "Introduction to Optics Geometrical and Physical," by John Robertson, Van Nostrand Company (1957). At each point along the length of interference filter 18, light of only one particular frequency passes through the filter. The frequency of the light which passes through the filter is a function of distance along the filter, as shown in FIGURE 3 where the frequency of the light which passes through the filter is plotted with respect to the distance along the filter.

Mask 24 is a small opaque object positioned on the optical axis. All of the unrefracted light is focused onto the face of mask 24 by lens 22. As indicated by lines 25 and 27 in FIGURE 1, light which is refracted by a pulse in delay line 14 is not focused onto mask 24. Naturally, mask 24 blocks refracted light in the zero order of the refraction pattern as it does unrefracted light. In the drawing for clarity of illustration, mask 24 is shown unsupported. In an actual device mask 24 may, for example, be supported by very thin wires.

The function of compensating mask 20 is to compensate for the fact that the transparency of the filter 18 is not uniform along the length x . Furthermore, there may be other non-linearities present in the optical system. For example, without mask 20 the intensity of the light arriving at the sample may be a function of frequency as indicated by the line A in FIGURE 4. The function of mask 20 is to linearize the response of the system so that the intensity of the light directed at the sample is constant with respect to frequency, that is, so that the intensity of the light arriving at the sample with respect to frequency is as indicated by the line B in FIGURE 4. This is accomplished by varying the transmissivity of mask 20 with respect to distance x . The transmissivity of mask 20 with respect to distance is the inverse if curve A is FIGURE 4. The variations in the transmissivity of mask 20 can be designed to compensate for non-linearities in the spectral distribution of the source, the transmission of the filter and the spectral sensitivity of the detector.

Mask 26 is inserted in front of sample 5 so that the area of sample 5 which is analyzed is restricted. The

**PATENT COOPERATION TREATY
INTERNATIONAL SEARCH REPORT**

IDENTIFICATION OF INTERNATIONAL APPLICATION	
International Application No. ¹	International Filing Date ¹ 24 January 1974
Receiving Office ¹	Priority Date Claimed ² 26 January 1973
Applicant ¹	

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ³
According to International Patent Classification (IPC) or to both National Classification and IPC Int. Cl.: F 01 M 3/02

II. FIELDS SEARCHED	
Minimum Documentation Searched ⁴	
Classification System	Classification Symbols
Int. Cl.:	F 01 M 3/02, F 01 M 3/00, F 01 M 3/04
Patent Documentation Searched other than Minimum Documentation ⁵	
DT 1877 - 1920	BE from 1926 on
FR 1902 - 1920	LU from 1946 on
GB 1909 - 1920	NL from 1912 on

III. TITLE, ABSTRACT AND FIGURE OF DRAWING
1. The following indicated items are approved as submitted by the applicant: ⁶ <input type="checkbox"/> Title. <input type="checkbox"/> Abstract.
2. The texts established by this International Searching Authority of the following indicated items are set forth on a supplemental sheet: ⁶ <input type="checkbox"/> Title. <input type="checkbox"/> Abstract.
3. <input type="checkbox"/> This report is incomplete as far as the abstract is concerned as the time limit for comments by the applicant on the draft prepared by this International Searching Authority has not expired. ⁷
4. The figure of the drawings indicated below is to be published with the abstract: ⁸ <input type="checkbox"/> Figure No. _____ as suggested by the applicant. ⁹ <input type="checkbox"/> Figure No. _____ because: <input type="checkbox"/> applicant failed to suggest a figure. ¹⁰ <input type="checkbox"/> this figure better characterizes the invention. ¹⁰

IV. UNITY OF INVENTION IS LACKING ¹¹ (Observations on supplemental sheet)

V. CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹² (Observations on supplemental sheet)

IV. <input type="checkbox"/> OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ¹¹	Page ...
1. Additional fees were paid by the applicant. Consequently, the International search covers:	
a. <input type="checkbox"/> all parts of the International application.	
b. <input type="checkbox"/> those parts of the International application covered by claims Nos. _____	
2. <input type="checkbox"/> The additional fees were paid under protest. Where requested by the applicant, the text of the protest together with the decision taken thereon are annexed to this report.	
3. <input type="checkbox"/> No additional fees were timely paid by the applicant. Consequently, the International search is restricted to the invention first mentioned ("main invention") only; it is covered by claims Nos. _____	

V. <input type="checkbox"/> OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹²
This International search report has not been established in respect of claims Nos. _____ for the following reasons:
1. <input type="checkbox"/> Claims Nos. _____ because their subject matter ¹³ relates to _____
2. <input type="checkbox"/> Claims Nos. _____ because they do not comply with the prescribed requirements to such an extent that a meaningful search could be carried out ¹⁴ (specify)

III. <input type="checkbox"/> TITLE, ABSTRACT *	Page ...
<p>This International Searching Authority has established the following text of the:</p> <p><input type="checkbox"/> Title.</p> <p><input type="checkbox"/> Abstract.</p>	

VI. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁵			Page ...
Category *	Citation of Document, ¹⁷ with indication, where appropriate, of the relevant passages ¹⁸	Relevant to Claim No. ¹⁹	
X	DT - A - 949.855 = page 2, lines 100-106; page 3, lines 7-28 and 46-49 =	27 April 1950	1-2
	FR - A - 1.337.636 = page 2, right column, third paragr.; page 3, left column, last paragr. =	B.O.P.I.N°37 - 1963	3
P	FR - A - 2.169.550 = page 6, lines 23-36; fig.6. =	7 September 1973	2
G	DT - A - 1.157.847	21 November 1963	

* Categories of cited documents: ¹⁸ "X" (document of particular relevance); "O" (document referring to an oral disclosure, use, exhibition, or other means); "E" (earlier document but published later than the international filing date); "G" (document defining the general state of the art); "P" (document published prior to the international filing date but later than the priority date claimed).

VII. CERTIFICATION	
Date of the Actual Completion of the International Search *	Date of Mailing of this Search Report *
International Searching Authority ¹	Signature of Authorized Officer ²⁰

These Notes are intended to facilitate the use of the present form. For full information, see the text of the Patent Cooperation Treaty and the texts of the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and the said texts, the latter are applicable. "Article" refers to Articles of the Treaty, "Rule" refers to Rules of the Regulations and "Section" refers to Sections of the Administrative Instructions.

- 1 "The international search report shall identify the International Searching Authority which established it by indicating the name of such Authority, and the international application by indicating the international application number, the name of the applicant, the name of the receiving Office, and the international filing date." (Rule 43.1)
- 2 "The international search report shall be dated and shall indicate the date on which the international search was actually completed. It shall also indicate the filing date of any earlier application whose priority is claimed." (Rule 43.2)
- 3 "The international search report shall contain the classification of the subject matter at least according to the International Patent Classification." (Rule 43.3 (a))
"Such classification shall be effected by the International Searching Authority." (Rule 43.3 (b))
"Where the subject matter of the international application must be provided with different classification symbols according to the principles to be followed in the application of the International Patent Classification to any given patent document, the international search report shall indicate all such symbols." (Section 504 (a))
"Where any national classification system is used, the international search report may indicate all the applicable classification symbols also according to that system." (Section 504 (b))
"Where the subject matter of the international application is classified both according to the International Patent Classification and to any national classification system, the international search report shall indicate the corresponding symbols of both classifications opposite each other." (Section 504 (c))
- 4 "The international search report shall list the classification identification of the fields searched. If that identification is effected on the basis of a classification other than the International Patent Classification, the International Searching Authority shall publish the classification used." (Rule 43.6 (a))
- 5 "If the international search extended to patents, inventor's certificates, utility certificates, utility models, patents or certificates of addition, inventor's certificates of addition or published applications for any of those kinds of protection, of States, periods, or languages, not included in the minimum documentation as defined in Rule 34, the international search report shall, when practicable, identify the kinds of documents, the States, the periods, and the languages to which it extended. For the purpose of this paragraph, Article 2 (ii) shall not apply." (Rule 43.6 (b))
- 6 "Subject to paragraphs (b) and (c), the international search report shall either state that the International Searching Authority approves the title and the abstract as submitted by the applicant or be accompanied by the text of the title and/or abstract as established by the International Searching Authority under Rules 37 and 38." (Rule 44.2 (a))
- 7 "If, at the time the international search is completed, the time limit allowed for the applicant to comment on any suggestion of the International Searching Authority in respect of the abstract has not expired, the international search report shall indicate that it is incomplete as far as the abstract is concerned." (Rule 44.2 (b))
- 8 "Where it is the International Searching Authority which, under Rule 8.2, indicates the figure or figures of the drawings to be published with the abstract, that Authority shall notify the applicant and the International Bureau accordingly." (Section 507)
- 9 The figure suggested by the applicant is indicated in the check list of the request; see Rule 3.3 (a) (iii).
- 10 "If the applicant fails to make the indication referred to in Rule 3.3 (a) (iii), or if the International Searching Authority finds that a figure or figures other than that figure or those figures suggested by the applicant would among all the figures of all the drawings, better characterize the invention, it shall indicate the figure or figures which it so considers. Publication by the International Bureau shall then use the figure or figures so indicated by the International Searching Authority. Otherwise, the figure or figures suggested by the applicant shall be used in the said publications." (Rule 8.2)
- 11 This part of the report is filled in only where, in the course of the procedure preceding the issuance of this report the International Searching Authority, having found that the international application does not comply with the requirement of unity of invention, invites the applicant to pay additional fees (see Article 17 (3) (a))
"If the applicant paid additional fees for the international search, the international search report shall so indicate. Furthermore, where the international search was made on the main invention only

(Article 17 (3) (a)), the international search report shall indicate what parts of the international application were and what parts were not searched." (Rule 43.7)

- 12 This part of the report is filled in only where Article 17 (2) (b) applies. (Where certain claims were not searched because of lack of unity of invention and non-payment of additional fees, part IV—rather than this part—is filled in.) Article 17 (2) reads as follows:

- "(a) If the International Searching Authority considers
- (i) that the international application relates to a subject matter which the International Searching Authority is not required, under the Regulations, to search, and in the particular case decides not to search, or
 - (ii) that the description, the claims, or the drawings, fail to comply with the prescribed requirements to such an extent that a meaningful search could not be carried out,

the said Authority shall so declare and shall notify the applicant and the International Bureau that no international search report will be established.

"(b) If any of the situations referred to in subparagraph (a) is found to exist in connection with certain claims only, the international search report shall so indicate in respect of such claims, whereas, for the other claims, the said report shall be established as provided in Article 18."

- 13 See Article 17 (2) (a) (i), quoted in note 12, above, and Rule 39 reading as follows:

"No International Searching Authority shall be required to search an international application if, and to the extent to which, its subject matter is any of the following:

- (i) scientific and mathematical theories,
- (ii) plant or animal varieties or essentially biological processes for the production of plants and animals, other than microbiological processes and the products of such processes,
- (iii) schemes, rules or methods of doing business, performing purely mental acts or playing games,
- (iv) methods of treatment of the human or animal body by surgery or therapy, as well as diagnostic methods,
- (v) mere presentations of information,
- (vi) computer programs to the extent that the International Searching Authority is not equipped to search prior art concerning such programs."

- 14 See Article 17 (2) (a) (ii), quoted in note 12, above.

- 15 "The objective of the international search is to discover relevant prior art." (Article 15 (2))
Rule 33.1, entitled "Relevant Prior Art for International Search," reads as follows:

"(a) For the purposes of Article 15 (2), relevant prior art shall consist of everything which has been made available to the public anywhere in the world by means of written disclosure (including drawings and other illustrations) and which is capable of being of assistance in determining that the claimed invention is or is not new and that it does or does not involve an inventive step (i.e., that it is or is not obvious), provided that the making available to the public occurred prior to the international filing date.

"(b) When any written disclosure refers to an oral disclosure, use, exhibition, or other means whereby the contents of the written disclosure were made available to the public, and such making available to the public occurred on a date prior to the international filing date, the international search report shall separately mention that fact and the date on which it occurred if the making available to the public of the written disclosure occurred on a date posterior to the international filing date.

"(c) Any published application or any patent whose publication date is later but whose filing date or, where applicable, claimed priority date, is earlier than the international filing date of the international application searched, and which would constitute relevant prior art for the purposes of Article 15 (2) had it been published prior to the international filing date, shall be specially mentioned in the international search report."

- 16 "Where any document cited in the international search report is of particular relevance, the special indication required by Rule 43.5 (c) shall consist of the "X" placed next to the citation of the said document." (Section 505)

"Where any document cited in the international search report refers to an oral disclosure, use, exhibition, or other means referred to in Rule 33.1 (b), the separate indication required by that Rule shall consist of the letter "O" placed next to the citation of the said document." (Section 508 (a))

"Where any document cited in the international search report is a published application or patent as defined in Rule 33.1 (c), the special mention required by that Rule shall consist of the letter "E" placed next to the citation of the said document." (Section 508 (b))
"Where any document cited in the international search report is a document which defines the general state of the art, it shall be

indicated by the letter "G" placed next to the citation of the said document." (Section 508 (c))

"Where any document cited in the international search report is a document whose publication date occurred earlier than the international filing date of the international application, but later than the priority date claimed in that application, it shall be indicated by the letter "P" next to the citation of the said document." (Section 508 (d))

17 "The international search report shall contain the citations of the documents considered to be relevant." (Rule 43.5 (a))

"Identification of any document cited in the international search report referred to in Rule 43.5 (b) shall be made by indicating the following elements in the order in which they are listed:

(a) *In the case of any patent document* (patent documents being patents within the meaning of Article 2 (ii) as well as published applications relating thereto)

- (i) the Office that issued the document, by the two-letter code as in *Annex B*;
- (ii) the kind of document, by the appropriate symbols as in *Annex C*;
- (iii) the number of the document as given to it by the Office that issued it;
- (iv) the date of publication as indicated on the patent document; and
- (v) where applicable, the pages, columns or lines where the relevant passages appear, or the relevant figures of the drawings.

(b) *In the case of any book or other separately issued publication*

- (i) the name of the author;
- (ii) the title (including, where applicable, the number of the edition and/or volume);
- (iii) the year, month and day of publication (where only less precise data appears on the book or other separately issued publication, such as the year and month, or only the year, then only such data as appear thereon need be indicated unless the complete data are readily available from an authoritative source);
- (iv) the name of the publisher;
- (v) the place of publication (where only the location of the publisher appears on the book or other separately issued publication, then that location shall be indicated as the place of publication); and
- (vi) where applicable, the pages, columns or lines where the relevant passages appear, or the relevant figures of the drawings.

(c) *In the case of any article published in a periodical or other serial publication*

- (i) the title of the periodical or other serial publication;
- (ii) the number of the volume and the date of the issue in which the article appears;

(iii) the place of publication (where only the location of the publisher appears in the periodical or other serial publication, then that location shall be indicated as the place of publication);

(iv) the author and the title of the article and the number of the page both on which the article starts and ends; and

(v) where applicable, the pages, columns or lines where the relevant passages appear, or the relevant figures of the drawings.

(d) *In the case of abstracts*

(i) the identification of the document containing the abstract in the manner set forth in paragraph (a), (b) or (c), respectively, depending upon whether the abstract is contained in a patent document, in a book or other separately issued publication, or in an article published in a periodical or other serial publication;

(ii) in the case where the abstract is not published together with the full text document which served as its basis, the identification of the full text document on the basis of whatever bibliographic data may be available in respect thereto." (Section 503)

18 "If only certain passages of a cited document are relevant or particularly relevant, they shall be identified, for example, by indicating the page, column, or the lines, where the passage appears." (Rule 43.5 (e))

19 "Citations which are not relevant to all the claims shall be cited in relation to the claim or claims to which they are related." (Rule 43.5 (d))

"The manner of indicating the claims to which cited documents are relevant shall be indicated by placing in the appropriate column of the international search report:

(i) where the cited document is relevant to one claim, the number of that claim; for example (2) or (17),

(ii) where the cited document is relevant to two or more claims numbered in consecutive order, the numbers of the first and last claims of the series connected by a hyphen; for example, (1-15) or (2-3),

(iii) where the cited document is relevant to one or more claims that are not numbered in consecutive order, the number of each claim placed in ascending order and separated by a comma or commas; for example, (1,6) or (1,7,10),

(iv) where the cited document is relevant to more than one series of claims under (ii) above, or to claims of both categories (ii) and (iii) above, the series or individual claim numbers and series placed in ascending order using commas to separate the several series, or to separate the numbers of individual claims and each series of claims; for example, (1-6, 9-10, 12-15) or (1, 3-4, 6, 9-11)." (Section 509)

20 "The international search report shall be signed by an authorized officer of the International Searching Authority." Rule 43.8)

BUNDESREPUBLIK DEUTSCHLAND



DEUTSCHES PATENTAMT

PATENTSCHRIFT

Nr. 949 855

KLASSE 46c¹ GRUPPE 2
INTERNAT. KLASSE F 02f

p 19780 Ia / 46c¹ D

Dr.-Ing. Herbert J. Venediger, Fürth (Bay.)
ist als Erfinder genannt worden

Dr.-Ing. Herbert J. Venediger, Fürth (Bay.)

Zweitaktbrennkraftmaschine mit Regelung der Schmierstoffzufuhr

Patentiert im Gebiet der Bundesrepublik Deutschland vom 28. Oktober 1948 an

Patentanmeldung bekanntgemacht am 27. April 1950

Patenterteilung bekanntgemacht am 6. September 1956

Bei Zweitaktmotoren mit Kurbelkastenspül- und Lädempumpe erfolgt die Schmierung des Triebwerks und der Zylinderflächen bisher fast ausschließlich dadurch, daß dem flüssigen Kraftstoff von vornherein eine bestimmte Menge von Schmieröl beigemischt wird. Bei dieser Mischungsschmierung muß die Schmierstoffmenge dem Vollastverbrauch angepaßt sein. Langjährige Erfahrungen haben ergeben, daß bei der Mischungsschmierung im Mittel auf 25 Raumteile Kraftstoff 1 Raumteil Schmieröl kommen muß, wenn die Maschine bei längerer Vollastbeanspruchung keinen Schaden erleiden soll. Bei fallender Drehzahl und/oder Belastung der Maschine erfolgt eine immer mehr zunehmende Überschmierung, was unnötigerweise Schmierstoff kostet und darüber hinaus der Maschine durch allmähliches Zusetzen der Steuerschlitze und Ver-

kleben der Kolbenringe großen Schaden zufügt. Dadurch sinkt die Motorleistung, so daß die Maschine noch mehr Kraftstoff-Schmieröl-Mischung verbraucht als vorher, was die Verhältnisse abermals verschlechtert, bis die Maschine schließlich vorzeitig überholungsreif geworden ist.

Tatsächlich kann aber z. B. ein Fahrzeugmotor, der bei voll geöffneter Saugleitung und seiner Höchstdrehzahl von etwa 5000 U/min zwecks ausreichender Schmierung auf ein Mischungsverhältnis von 1:25 angewiesen ist, bei Teillast und veringierter Drehzahl ohne weiteres mit einem viel öfärmeren Mischungsverhältnis vorteilhafter betrieben werden, z. B. mit dem Verhältnis von bis 1:60. Die Schmierung ist ideal, wenn das Mischungsverhältnis vom Ausgangswert 1:60 bei niedriger Belastung und niedriger Drehzahl kontinuier-

RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE L'INDUSTRIE

SERVICE
de la PROPRIÉTÉ INDUSTRIELLE

BREVET D'INVENTION

P.V. n° 913.124

N° 1.337.636

Classif. internat. : B 62 d — F 02 b — F 02 f

Moteur à combustion interne avec réglage automatique du mélange de combustible et d'huile de graissage.

Société dite : AUTO UNION G. M. B. H. résidant en Allemagne.

Demandé le 23 octobre 1962, à 14^h 37^m, à Paris.

Délivré par arrêté du 5 août 1963.

(Bulletin officiel de la Propriété industrielle, n° 37 de 1963.)

(Demande de brevet déposée en République Fédérale d'Allemagne le 10 novembre 1961, sous le n° A 38.790, au nom de la demanderesse.)

Cette invention concerne un dispositif pour la préparation d'un mélange de combustible et d'huile destiné à l'alimentation d'un moteur à combustion interne. Dans un dispositif mélangeur connu de ce genre, l'huile de graissage passe en quantité dosée à travers un obturateur-régulateur commandé par le mécanisme de dosage ou de réglage du moteur. Ce dispositif conserve l'avantage qui consiste en ce que l'huile est aussi finement dispersée dans le combustible que pour le graissage usuel par mélange. Cependant, le réglage de la composition du mélange d'huile et de combustible ne permet pas de doser correctement la quantité d'huile nécessaire à chaque régime de fonctionnement dans un moteur à combustion interne, dont la charge imposée subit des variations très importantes, étant donné que l'inertie de réponse du dispositif de réglage connu est trop grande. La tuyauterie allant de l'obturateur-régulateur au gicleur du carburateur contient une réserve relativement importante d'un mélange de combustible et d'huile, dont les proportions correspondent à un régime de fonctionnement précédent, et qui doit être consommée avant que le mélange correspondant au nouveau réglage puisse atteindre le gicleur, et ensuite les points de graissage du moteur. Le dispositif mélangeur et les organes d'un vilebrequin agissant sur un obturateur ou régulateur aggravent la complication de l'ensemble.

Les inconvénients des obturateurs et distributeurs se manifestent surtout lorsqu'il s'agit de régler le débit pour faire passer des quantités d'huile particulièrement réduites, étant donné que les sections de passage sont alors très réduites. Les différences de la section de passage résultant d'une usure non uniforme, ou même

de petites imprécisions de fabrication, exercent une action importante sur la quantité de l'huile admise. La section de passage risque d'autant plus d'être obstruée par une impureté de l'huile que la section déterminée par le réglage d'un obturateur ou distributeur est plus petite, et il en résulte alors un arrêt dans l'admission de l'huile.

Un autre mode de réalisation connu comprend un circuit de graissage distinct à réservoir à huile, conduit d'aspiration, pompe de graissage, et conduit de retour raccordé au réservoir. Au point de raccordement entre le conduit de refoulement et le conduit de retour est intercalé un organe de commande accouplé à l'organe de réglage de la puissance de la machine, et intervenant pour prélever la partie de l'huile nécessaire au graissage de la machine, et pour la faire passer dans un conduit aboutissant au conduit d'aspiration de cette machine.

Ce réglage par modification de la section de passage d'un conduit partant d'un circuit de graissage présente un inconvénient en ce sens que la portion d'huile passant par la section de réglage pour arriver à la machine dépend de la température, donc également de la viscosité de l'huile, qui est très épaisse lorsqu'elle est froide. Une même section laisse donc passer une quantité d'huile plus faible que lorsque la machine est chaude, parce que l'huile est alors plus fluide. Si la quantité d'huile est correctement dosée pour la machine froide, celle-ci reçoit une quantité d'huile trop importante lorsqu'elle est chaude. L'inconvénient du graissage usuel par mélange s'ajoute alors à la conception compliquée du dispositif de réglage.

Le but de l'invention est de remédier aux inconvénients précités, et de créer un dispositif

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- (71) Déposant : VALLS Joseph, résidant en France.
- (73) Titulaire : *Idem* (71)
- (74) Mandataire : Pierre Marek, 28, rue de la Loge, 13-Marseille (2).
- (54) Perfectionnements aux moteurs à injection et, plus particulièrement, aux moteurs à injection d'essence.
- (72) Invention de :
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DEUTSCHES PATENTAMT



INTERNAT. KL. F 02i

AUSLEGESCHRIFT 1 157 847

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UND AUSGABE DER
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Die Erfindung betrifft eine Zweitaktbrennkraftmaschine mit Kurbelgehäusepumpe und Mischungsschmierung sowie mit Einspritzung des Kraftstoff-Öl-Gemisches in zwei Teilmengen gleichen Mischungsverhältnisses, von denen die eine in den Zylinder und die andere in das Kurbelgehäuse eingespritzt wird. Bei der bekannten Maschine erfolgt die Einspritzung der direkt in den Zylinder gelangenden Teilmenge durch die vom Kolben im unteren Totpunkt freigelegte Überströmöffnung hindurch, also in Richtung des Spülstromes. Die andere Teilmenge wird mittels derselben Düse durch eine zu einem späteren Zeitpunkt (etwa im oberen Totpunkt) vor die Überströmöffnung gelangende Öffnung im Kolbenmantel in das Kolbeninnere, d. h. in den Kurbelraum eingespritzt. Man bezweckt damit im Vergleich zu den üblichen Mischungsgeschmierten Maschinen, bei denen die ganze Kraftstoff-Öl-Ladung in das Kurbelgehäuse eingeführt wird, einen geringen Anteil der Spülluft an Kraftstoff-Öl-Gemisch, so daß eine geringere Verlustmenge Kraftstoff und Öl durch den Auslaß hinausgespült wird. Dieses Ziel wird aber durch die bekannte Maschine nur in beschränktem Umfang erreicht. Die Einspritzung im unteren Totpunkt erfolgt nämlich gerade in den Spülstrom hinein, so daß noch immer ein beträchtlicher Anteil dieser Teilmenge verlorengehen kann. Dieser Verlust wird auch durch Anspritzen des Kolbens und der gegenüberliegenden Zylinderwand — wie es in diesem bekannten Fall vorgesehen ist — nicht vermieden. Zudem kann dieses direkte Anspritzen zu Betriebsstörungen Anlaß geben, da es schwierig sein dürfte, eine einwandfreie Verteilung des Schmieröls auf der Zylinderwand zu erreichen und ein Verziehen von Kolben und Zylinder zu vermeiden.

Diese Nachteile werden durch die Erfindung vermieden, die darin besteht, daß beide Teilmengen zugleich und wenigstens annähernd im Zeitpunkt des Schließens des Überströmkanals durch den aufwärtsgehenden Kolben eingespritzt werden. Dies hat den Vorteil, daß der Spülvorgang, sobald der aufwärtsgehende Kolben die Überströmöffnung schließt, im wesentlichen beendet ist, da in diesem Augenblick der eigentliche Spülstrom unterbrochen und zudem in üblicher Weise gleichzeitig bzw. nur eine ganz unbedeutende Winkelverdrrehung später der Auslaß geschlossen wird. Beim Erfindungsgegenstand erfolgt die eine Teileinspritzung direkt in den Zylinder, da ja die Überströmöffnung, durch die hindurch in dem bekannten Fall eingespritzt wird, praktisch geschlossen ist.

Die gleichzeitige Einspritzung beider Teilmengen,

Zweitaktbrennkraftmaschine
mit Kurbelgehäusepumpe
und Mischungsschmierung

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ist als Erfinder genannt worden

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hat noch weitere Vorteile. Beim üblichen Vergaserbetrieb und bei der oben beschriebenen bekannten Maschine steht nur etwa die Zeitspanne einer halben Kurbelwellenumdrehung zur Verfügung, in welcher der im Kurbelgehäuse befindliche Kraftstoff verdampfen und ein Teil des Öles sich auf den Lagerflächen niederschlagen kann. Beim Erfindungsgegenstand erfolgt diese Einspritzung ins Kurbelgehäuse bedeutend früher, und die Zeitspanne für die Trennung von Kraftstoff und Öl ist demnach wesentlich größer. Hinzu kommt, daß der durch den aufwärtsgehenden Kolben verursachte Unterdruck im Kurbelgehäuse schon gleich nach der Einspritzung das Verdampfen des Kraftstoffes begünstigt.

Die zur Schmierung der Lager des Kurbeltriebes erforderliche Ölmenge je Kurbelwellenumdrehung, d. h. die ins Kurbelgehäuse eingespritzte und an den Spülverlusten beteiligte Kraftstoff-Öl-Menge kann daher verringert werden, wobei eine entsprechend gerichtete Einspritzung zu einer weiteren Verringerung beitragen kann. Bei der bekannten Maschine dagegen ist man an die Spritzrichtung der in den Zylinder hinein gerichteten Düse gebunden. In Ausgestaltung der Erfindung kann ein einziges Pumpenelement zur Einspritzung beider Teilmengen dienen.

Es soll noch erwähnt werden, daß es bekannt ist, die volle Ladung Kraftstoff-Öl-Gemisch direkt in den Brennraum einer Zweitaktbrennkraftmaschine einzuspritzen. Wenn die Spülverluste hierbei minimal sein dürften, so hat diese bekannte Maschine doch den entscheidenden Nachteil, daß die Lager des Triebwerkes lediglich vom Kolben abspritzendes, d. h. durch Verbrennungsrückstände und Abtrieb verunreinigtes Öl erhalten.