

76859/87

CONVENTION

AUSTRALIA

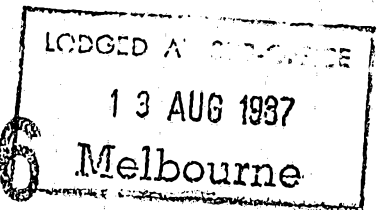
Patents Act

APPLICATION FOR A STANDARD PATENT

I/We Mobil Oil Corporation

of 150 East 42nd Street,
New York,
New York,
UNITED STATES OF AMERICA.

602346



hereby apply for the grant of a standard patent for an invention entitled:

BLEND OF POLYETHYLENE AND HIGH IMPACT POLYMERS OF
STYRENES AND FILMS THEREOF

which is described in the accompanying complete specification.

CLAIMS AND ABSTRACTS

27-7-90

Details of basic application

Number of basic application: 902,718

Convention country in which
basic application was filed: UNITED STATES OF AMERICA

Date of basic application : 2 September 1986

Address for Service:

PHILLIPS ORMONDE & FITZPATRICK
Patent and Trade Mark Attorneys
367 Collins Street
Melbourne 3000 AUSTRALIA

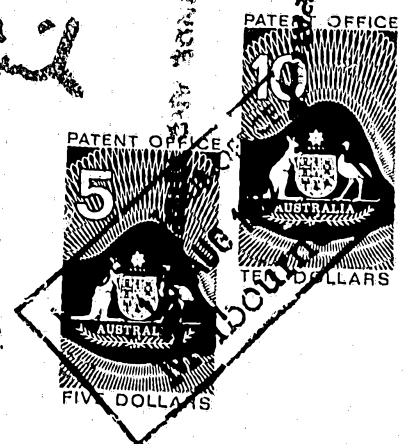
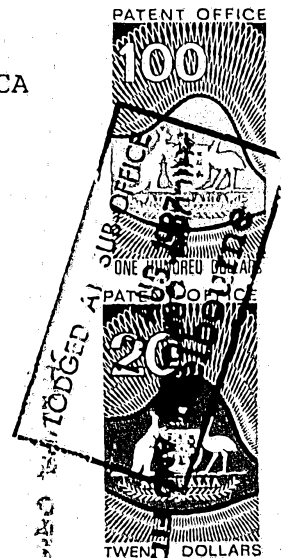
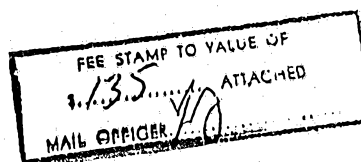
Dated: 4 August 1987

PHILLIPS ORMONDE & FITZPATRICK
Attorneys for:
Mobil Oil Corporation,

By:

David B Fitzpatrick

Our Ref : 63358
POF Code: 1462/1462



6012q/1

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DECLARATION FOR A PATENT APPLICATION

▼ INSTRUCTIONS

- (a) Insert "Convention"
If applicable
(b) Insert FULL name(s)
of applicant(s)

In support of the (a) Convention application made by
(b)

MOBIL OIL CORPORATION

- (c) Insert "of addition"
If applicable
(d) Insert TITLE of
invention

(hereinafter called "applicant(s)" for a patent (c) for an
invention entitled (d)

BLENDS OF POLYETHYLENE AND HIGH IMPACT POLYMERS OF STYRENES AND
FILMS THEREOF

- (e) Insert FULL name(s)
AND address(es) of
declarant(s)
(See headnote*)

I/~~We~~ (e) EDWARD H. VALANCE of Mobil Oil Corporation of
150 East 42nd Street, New York, New York 10017,
UNITED STATES OF AMERICA

do solemnly and sincerely declare as follows:

1. ~~KXXXXXXXXXXXXXXXXXXXXXXX~~

(or, in the case of an application by a body corporate)

1. I am/~~We~~ are authorized to make this declaration on behalf of the applicant(s).

2. ~~KXXXXXXXXXXXXXXXXXXXXXXX~~

(or, where the applicant(s) is/are not the actual inventor(s))

2. (f) DAVID VINCENT DOBRESKI, 99 Country Downs Circle, Monroe County,
Fairport, New York, United States of America

- (f) Insert FULL name(s)
AND address(es) of
actual inventor(s)

- (g) Specify how appli-
cant(s) derive(s)
title from actual
inventor(s)
(See headnote**)

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

(g)

The applicant is the assignee of the invention
from the actual inventor.

(Note: Paragraphs 3 and 4 apply only to Convention applications)

- (h) Insert country,
filing date, and
basic applicant(s)
for the/or EACH
basic application

3. The basic application(s) for patent or similar protection on which the application is based
is/~~are~~ identified by country, filing date, and basic applicant(s) as follows:

- (i) United States of America, U.S. Serial No. 902,718
filed September 2, 1986
David Vincent Dobreski

4. The basic application(s) referred to in paragraph 3 hereof was/~~were~~ the first application(s)
made in a Convention country in respect of the invention the subject of the application.

- (k) Insert PLACE of
signing

Declared at (k) Fairfax, Virginia, U.S.A.

- (l) Insert DATE of
signing

Dated (l) July 23, 1987

- (m) Signature(s) of
declarant(s)

(m) MOBIL OIL CORPORATION

BY: Edward H. Valance

Edward H. Valance

Associate General Patent Counsel
Authorized Attorney in Fact

Note: No legalization or
other witness required

To: The Commissioner of Patents

(12) PATENT ABRIDGMENT (11) Document No. AU-B-76859/87
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 602346

(54) Title
BLENDS OF POLYETHYLENE AND HIGH IMPACT POLYMERS OF STYRENES

International Patent Classification(s)
(51)⁴ C08L 023/08

(21) Application No. : 76859/87

(22) Application Date : 13.08.87

(30) Priority Data

(31) Number	(32) Date	(33) Country
902718	02.09.86	US UNITED STATES OF AMERICA

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(71) Applicant(s)
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(56) Prior Art Documents
AU 66447/86 C08L 23/08 C08J 5/18
US 4579912
US 4503187

(57) Claim

1. A film comprising a composition which comprises
(a) a linear copolymer of ethylene and an alpha-olefin
having from 4 to 10 carbon atoms and having a density of
less than 0.94 and (b) from 1 to 15 percent by weight of the
composition of an impact polymer which comprises an impact
polystyrene or an impact poly(para-methylstyrene) containing
from 1 to 20 percent by weight of the impact polymer of a
rubber.

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COMPLETE SPECIFICATION
(ORIGINAL)

Application Number:
Lodged:

Class

Int. Class

Complete Specification Lodged:
Accepted:
Published:

60 2346

Priority

Related Art:

APPLICANT'S REFERENCE: F-4091

Name(s) of Applicant(s):

Mobil Oil Corporation

Address(es) of Applicant(s):

150 East 42nd Street,
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New York,
UNITED STATES OF AMERICA.

Address for Service is:

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367 Collins Street
Melbourne 3000 AUSTRALIA

Complete Specification for the invention entitled:

BLENDS OF POLYETHYLENE AND HIGH IMPACT POLYMERS OF STYRENES
AND FILMS THEREOF

Our Ref : 63358
POF Code: 1462/1462

The following statement is a full description of this invention, including
the best method of performing it known to applicant(s):

BLEND OF POLYETHYLENE AND HIGH IMPACT POLYMERS
OF STYRENES AND FILMS THEREOF

This invention relates to films of blends of polyethylene and high impact polymers of styrenes; more particularly, this invention relates to films of blends of linear low density polyethylenes with high impact polystyrenes and poly(para-methylstyrene)s with improved blocking characteristics.

Linear low density polyethylenes (LLDPE) are widely used commercially in films. The films are conventionally prepared by blown film extrusion and have generally good properties. However, they can exhibit undesirably low stiffness for some uses and have marginal machine direction tear and puncture tear propagation characteristics. U.S. Patent 4,579,912 discloses the use of polystyrene or poly(para-methylstyrene) to improve tear strength when blended with LLDPE. This invention is based on the observation that improved blocking characteristics can be achieved using an impact polystyrene or impact poly(para-methylstyrene) resin while largely retaining the other important physical properties of the film, especially reduced splittiness.

This invention provides a film comprising a composition which comprises (a) a linear copolymer of ethylene and an ~~alpha-olefin having from 4 to 10 carbon atoms and (b) from 1 to 15~~ percent by weight of the composition of an impact polymer which comprises an impact polystyrene or an impact poly(para-methylstyrene) containing from 1 to 20 percent by weight of the impact polymer of a rubber.

The major component of the films of this invention is a linear copolymer of ethylene (a) having a density from 0.85 to 0.96, ~~suitably from 0.90 to 0.94, preferably from 0.91 to 0.93. Polymers~~



alpha-olefin having from 4 to 10 carbon atoms and having a density of less than 0.94, and (b) from 1 to 15 percent by weight of the composition of an impact polymer which comprises an impact polystyrene or an impact
5 poly(para-methyl-styrene) containing from 1 to 20 percent by weight of the impact polymer of a rubber.

The major component of the films of this invention is a linear copolymer of ethylene (a) having a density less than 0.94, suitably from 0.90 to 0.94, preferably from 0.91
10 to 0.93. Polymers

referred to as linear low density polyethylenes (LLDPE) are particularly suitable. Suitable copolymers are copolymers of ethylene and alpha-olefins containing 4 to 10, preferably from 4 to 8, carbon atoms. Copolymers of ethylene and 1-butene, 1-hexene, 1-octene and 4-methyl-1-pentene are commercially important, and widely available.

The impact polymers (b) which are used in this invention are also commercially available. Suitable impact polymers are prepared by polymerizing styrene or para-methylstyrene monomer in the presence of a rubber such as polybutadiene with a free radical catalyst such as benzoylperoxide under conditions which promote grafting of polystyrene or poly(para-methylstyrene) onto the rubber backbone. The rubber comprises from 1 to 20, preferably from 4 to 10, percent by weight of the polymer. Impact polymers containing high rubber contents, e.g., 18 weight percent and 5 micron particles give films with excellent blocking but result in reduced modulus (stiffness). Therefore, if high modulus is desired, impact polymers with rubber contents below about 10 weight percent are desirable. Polybutadiene is the preferred rubber but other rubbers and rubbery polymers and copolymers can be used as the backbone of the impact polymer. Impact resins of polystyrene and the like can vary considerably, not only in the rubber content but also in the particle size of the dispersed rubber particles. Generally, particle diameters of 2 to 20 microns are suitable but it has been found that larger particle sizes in excess of 4 microns are advantageous and such impact polymers are therefore preferred.

The impact polymer can comprise up to about 15 percent or even more by weight of the composition. However, the character of the film changes markedly when amounts much larger than about 10 weight percent of the impact polymer are present. At amounts below about 10 weight percent, for example from 5 to 8 weight percent, the film exhibits excellent physical properties such as tear strength. At higher amounts, for example at 15 weight percent of a HIPS resin having a low rubber content, the film is somewhat stiffer and has

the tear and fold characteristics of paper. At either high or low levels the film exhibits good blocking which is considered an important advantage of this invention over known films where polystyrene is used as an additive instead of the impact polystyrene.

10 The unexpectedly good blocking characteristics of the films of this invention and their other physical properties make the films particularly suitable for the production of thin bags of a gauge of less than 1 mil. The superior blocking qualities of the bags contributes to their easy opening characteristics, an important consideration during use. Also, because the blocking characteristics are improved, it is possible to decrease or remove conventional inorganic anti-block agents which are generally detrimental to physical properties, add high impact polymer and produce a film with better ultimate tensile, puncture and MD tear strength than virgin LLDPE with inorganic anti-block agent.

20 The following Examples illustrate the invention; all parts are by weight unless otherwise indicated. Examples C-1 to C-6 inclusive are not of this invention but are given for the purposes of comparison.

EXAMPLES 1-3

Films were produced by dry blending LLDPE and PS or HIPS at the extruder hopper. Blown (0.75-0.80 mil) film was produced using the standard blown film extrusion process.

28 The films were evaluated for blocking after conditioning at 50 psi and at 140°F, for 24 hours, and for machine direction puncture propagation tear (MD PPT) which is regarded as a measure of the splittiness of the films.

<u>Example</u>	<u>Composition</u>	<u>Blocking (g)</u>	<u>MD PPT Tear (cm)</u>
C-1	LLDPE (0.922 g/cc)	101	4.9
C-2	LLDPE + 5% PS	96	4.7
1*	LLDPE + 5% HIPS	66	4.2
C-3	LLDPE (0.928 g/cc)	97	7.7
C-4	LLDPE + 3% PS	79	6.7
2*	LLDPE + 3% HIPS	66	6.7
C-5	LLDPE (0.922 g/cc)	119	5.0
C-6	LLDPE + 3% PS	112	4.8
3*	LLDPE + 3% HIPS	85	5.0

*Examples of this invention.

LLDPE (0.922 g/cc) is an ethylene-octene copolymer. Melt Index 0.7.

LLDPE (0.928 g/cc) is an ethylene-octene copolymer. Melt Index 1.0

PS is a crystal polystyrene resin, Mobil 1240.

HIPS is a high impact polystyrene in which the rubber is polybutadiene (about 8 weight percent) and an average rubber particle size of about 4.5 microns.

The claims defining the invention are as follows:

1. A film comprising a composition which comprises (a) a linear copolymer of ethylene and an alpha-olefin having from 4 to 10 carbon atoms and having a density of less than 0.94 and (b) from 1 to 15 percent by weight of the composition of an impact polymer which comprises an impact polystyrene or an impact poly(para-methylstyrene) containing from 1 to 20 percent by weight of the impact polymer of a rubber.

2. A film according to claim 1 in which the linearcopolymer (a) is a copolymer of ethylene and an alpha-olefin having from 4 to 8 carbon atoms.

3. A film according to any preceding claim in which the linear copolymer (a) is a copolymer of ethylene and butene, hexene, 4-methyl-1-pentene or octene.

4. A film according to any preceding claim in which the impact polymer (b) comprises impact polystyrene.

5. A film according to any preceding claim in which the impact polymer (b) comprises impact poly(para-methylstyrene).

6. A film according to any preceding claim in which the rubber in the impact polymer (b) comprises polybutadiene.

7. A film according to any preceding claim in which the impact polymer (b) comprises rubber particles having an average particle diameter from 2 to 20 microns.

8. A film according to any preceding claim in which the impact polymer (b) comprises from 4 to 10 percent by weight of a rubber.

9. A film according to any preceding claim in which

the impact polymer (b) comprises from 5 to 8 percent by weight of the composition.

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10. A plastics container comprising a film according to any preceding claim.

11. A film substantially as hereinbefore particularly described with reference to any one of Examples 1, 2 or 3.

DATED: 3 July 1990

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