FORM 1

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952 640124

APPLICATION FOR A STANDARD PATENT

I\We,

UNILEVER PLC

of UNILEVER HOUSE
BLACKFRIARS
LONDON EC4
ENGLAND

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

BUTTER CONTAINING SPREAD AND PROCESS FOR PREPARATION THEREOF.

which is described in the accompanying complete specification

Details of basic application(s):

Number of basic application	Name of Convention country in which basic application was filed	Date of basic application
8904942.3	GB	03 MAR 89
8925624.2	GB	13 NOV 89

My/our address for service is care of GRIFFITH HACK & CO., Patent Attorneys, 601 St. Kilda Road, Melbourne 3004, Victoria, Australia.

DATED this 27th day of February 1990

UNILEVER PLC

GRIFFITH HACK & CO.

TO: The Commissioner of Patents.

270290

AUSTRALIA B

PATENTS ACT 1952 Application by Assignee of Inventor

L 7206 (R)

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

Name of Applicant: In support of an application made by UNILEVER PLC

Title: for a patent for an invention entitled:
BUTTER CONTAINING SPREAD AND PROCESS FOR PREPARATION THEREOF

Full name and address of Signatory: I, Dilshad Rajan
Authorized Signatory
of Unilever House, Blackfriars, London E.C.4, Great Britain,

do solemnly and sincerely declare as follows:-

1. I am authorized by the abovementioned applicant to make this declaration on its behalf.

Full name and address of Inventor(s): 2. The name and address of each actual inventor of the invention is as follows:
Frederick William CAIN, a British subject of Dr Blookerstraat 12, 2271 Voorburg, The Netherlands, Peter Bernard ERNSTING, a Dutch subject of Van Barenstraat 29, 2628 LC Delft, The Netherlands; Pieter Maria Jozef HOLEMANS, a Belgian citizen of Schapendreef 3, 2080 Kapellen, Belgium; Tjaard Robert Jan NIEMEYER, a Dutch subject of Eksterlaan 186, 3136 SC Vlaardingen, The Netherlands

See notes over

3. The facts upon which the applicant is entitled to make this application are as follows:-
The applicants are the assignees of UNILEVER N.V. who in turn is the assignee of the employers of the actual inventors Mr F.W. Cain, Mr P.B. Ernsting and Mr T.R.J. Niemeyer; the applicants are the assignees of UNION N.V., who are the employers of Mr P.M.J. Holemans

Delete paragraphs 3 and 4 for Non-Convention Application

4. The basic application(s) as defined by Section 141 of the Act was/were made as follows:
Country Great Britain on 3 March 1989
in the name(s) UNILEVER PLC
and in Great Britain on 13 November 1989
in the name(s) UNILEVER PLC

Place and Date of Signing

5. The basic application(s) referred to in the preceding paragraph was (were) the first application(s) made in a Convention country in respect of the invention the subject of this application.

Declared at London
this 14th day of February 1990
Signed
Position

GRIFFITH HACK & CO
Patent and Trade Mark Attorneys
Melbourne . Sydney . Perth

AU9050505

(12) PATENT ABRIDGMENT (11) Document No. AU-B-50505/90
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 640124

(54) Title
BUTTER CONTAINING SPREAD AND PROCESS FOR PREPARATION THEREOF

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H01J 037/34

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(56) Prior Art Documents
GB 1598362
AU 482193 71615/74 A23C
US 4436760

(57) Claim

1. Edible water-in-oil emulsion spread comprising 30-70% wt. of an aqueous phase and butterfat characterized in that the butterfat originates from cream having a fat content in excess of 40% wt. and a dry olein fraction of butterfat only, and the weight ratio of the said cream to the said dry olein fraction is from 1:10 to 10:1.

AUSTRALIA

PATENTS ACT 1952

Form 10

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE 640124

Short Title:

Int. Cl:

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Complete Specification-Lodged:
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Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

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Complete Specification for the invention entitled:
BUTTER CONTAINING SPREAD AND PROCESS
FOR PREPARATION THEREOF.

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

BUTTER CONTAINING SPREAD AND PROCESS FOR PREPARATION THEREOF

The present invention relates to a butter-containing spread, and a process for the production of the said spread.

For convenience the present specification uses the term "butter-like spread" to refer to a plastic edible dispersion other than butter which exhibits butter-like properties.

Creams are emulsions of the oil-in-water type, and are well known both as starting materials and intermediates in methods for the production of butters and spreads. In such methods the dispersed fat phase of the cream is converted by phase-inversion into a continuous part-crystallised fat phase in which a dispersed aqueous phase is present. With dairy cream, particularly in conventional butter-making, this has been accomplished by the well-established method of cooling and working a 40%wt butter-fat cream in a churn. During churning partial phase separation occurs with loss of much of the aqueous phase as buttermilk and a concentration of the fat phase as the butter mass.

Churned butter has desirable mechanical properties as regards spreadability and elasticity over a relatively narrow range of temperatures, and much research has concerned how this range can be extended. On the one hand work the addition of additional aqueous phase to butter has produced low-calorie spreads with greater ease of spreading than butter. On the other hand the addition of relatively fluid oils and fats to butter-fat has reduced the overall hardness of high-fat (80%) spreads prepared with the resulting blend.

A general difficulty with low-calorie spreads and with soft, high-fat spreads is that the spreads are organoleptically inferior to butter. Research to determine the factors which allow the consumer to distinguish traditional butter from spreads, has only met with limited success.

In such comparative tests experienced tasters are provided with samples of butter and samples of a number of spreads, and asked to indicate the preferred product in a number of blind pair-comparisons. Analysis of the preferences reveals whether or not the spreads exhibit a significant butter likeness. While some spreads score better than others, those with an improvement in refrigerator spreadability are often significantly less preferred to butter.

We have identified a method for the production of both low calorie and reduced fat spreads which yields a product for which the organoleptic preference scores are such that the product is not significantly less preferable to butter.

In our process a wet-butterfat concentrate of a relatively high fat-phase content is admixed with anhydrous butterfat and worked to produce a low calorie spread.

Accordingly, a first aspect of the present invention provides an edible water-in-oil emulsion spread comprising 30-70% wt. of an aqueous phase and butterfat characterized in that the butterfat originates from cream having a fat content in excess of 40% wt. and a dry olein fraction of butterfat only, and the weight ratio of the said cream to the said dry olein fraction is from 1:10 to 10:1.

AUSTRALIAN PATENT OFFICE

A further aspect of the invention provides a process for the preparation of an edible emulsion as mentioned above which comprises the steps of;

a) admixing a butterfat component and a non-dairy aqueous phase, optionally including therein a gelling or thickening agent and

b) working the product of step a) under conditions of sufficient high shear that a stable water-in-oil emulsion with essentially the same composition as the product of step a) results, characterized in admixing dairy cream having a fat content in excess of 40% wt. and dry butter olein in a weight ratio of 1:10 to 10:1 as butterfat component.

It is believed that one advantage of using both wet and dry butterfat components stems from the difference in the organoleptic properties of these two components.

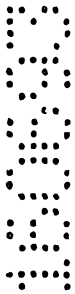
For the purposes of the present specification, the term wet-concentrated butterfat is intended to embrace within its scope both concentrated cream, having a fat content in excess of 40% wt. and butter. Butter has a typical fat content of above 70% being typically around 80%. In both of these cases the butterfat to water phase ratio has been increased over that found in natural dairy cream (around 40% fat). The cream may be concentrated from 40% wt. using a cream separator whereas the butter is typically prepared from dairy cream by churning of dairy cream in a butter churn.

Without wishing to restrict the scope of the invention by reference to some theory of operation, it is observed that the wet-concentrated butterfat has not at any time become anhydrous, and it is believed that this has an effect on

AUSTRALIAN PATENT OFFICE

the flavour and other organoleptic properties of the products according to the present invention.

When concentrated cream is used instead of butter, not only do the above-mentioned advantages accrue, but is envisaged that a greater proportion of the cream globule phospholipids and other components of the lactating membrane survive the manufacturing process and promote a "creamy" organoleptic impression on consumption. However, it should be noted that the handling of concentrated cream presents certain technical and



microbiological difficulties and in the absence of a certain supply of fresh dairy cream the use of butter is preferred.

Typically, the wet-concentrated butter-fat has a butterfat triglyceride content of at least 60%wt. In some embodiments of the invention such concentrates comprise a concentrated cream comprising between 60 and 70% wt fat. Such a cream can be obtained by the separation of a lactose-rich fraction from milk or cream. Such as by concentration of milk in a cream separator by known methods. The skim-milk which can be put to a variety of uses. If a cream with a butter-fat content of over 70% is employed the high viscosity of the cream makes it somewhat difficult to handle, however it has been determined that creams can be concentrated in a cream separator to well above 90% fat. Should facilities for cream concentration be unavailable, concentrated cream is available in the marketplace. In other embodiments of the present invention the wet-concentrated butterfat comprises butter or mixtures of butter and cream. Butter has a fat content of around 80% and can be handled with greater ease than concentrated creams. Butter can be obtained by conventional churning of a 40% fat cream as described in the preamble.

For the purposes of the present specification the term dry-butterfat is intended to embrace butter-fats which have been rendered anhydrous at some time during the concentration process. The dry butterfat component contributes a different set of flavour components to the product. It is believed that rendering the butterfat anhydrous causes the formation of flavour components which are not present in fresh dairy butter or cream.

Whereas the dry butterfat component may have the same fatty acid content as whole butterfat it is preferable

that the dry butterfat component comprises a fraction of butterfat, preferably an olein fraction of butterfat.

The use of butter olein softens the eventual product. While this is not strictly necessary in the formation of the low or reduced fat spreads according to the present invention it is preferable that the fat phase viscosity should be lowered towards the viscosity of the water-phase.

Additionally, by use of a butter olein it is possible to ensure that a major part of the flavour components naturally present in butter are present in the product, as these flavour components are preferentially recovered in the olein rather that the stearin upon fractionation of butterfat.

Preferably the olein fraction is one having a melting point less than 20°C, more preferably less than 15°C and most preferably less than 10°C.

Butter olein may be fractionated from butter-fat by any suitable method, many of which are given in the available literature. As with the cream, should facilities for the preparation of butter and extraction of the olein be unavailable, both of these commodities are available in the marketplace.

In addition to the flavour aspect of the butter olein, we have determined that the use of such a low-melting fat enables the amount of thickener to be reduced. It is believed that products have particularly favorable mouthfeel when the viscosity of the aqueous phase approximates to that of the fat phase. Thus, by using a lower-melting fat phase it is possible to match the viscosity of the water phase to that of the fat phase in the water phase in the presence of a lesser amount of thickener. This is important in the presence of

thickeners such as gelatine which may have, or with time, develop an off-taste at higher concentrations.

Preferred emulsions according to the present invention comprise 30-50%wt fatty phase and 70-50% aqueous phase. More preferably, these emulsions comprise butterfat, butter olein and a non-dairy aqueous phase.

The method for preparation of these emulsions comprises the steps of;

a) admixing butter, butter olein and a non-dairy aqueous phase to form a premix, and,

b) working the pre-mix under conditions of sufficiently high shear that a stable edible water in oil emulsion with the essentially the same composition as the premix results.

Introducing into the pre-mix a quantity of non-dairy aqueous phase not only enables the final fat content of the spread to be reduced, but also enables the final inorganic salt content of the product, final pH and the final lactose content of the product to be controlled. In preferred embodiments of the invention the final pH is less than 5.5 and the final lactose content is below 2%. The aqueous phase of the final product is subject to significant variation and may comprise thickeners and/or emulsifiers.

It should be noted that in this specification the term "non-dairy", when used to describe the added aqueous phase, refers generally to those water phases having a relatively low content of lactose. The presence of other dairy substances in the water phase, such as caseinate, is optional. The presence of thickeners or gelling agents in the water phase is particularly preferred where the fat phase content is less than 65% of the eventual product, suitable thickeners and gelling agents include gelatine, locust bean gum, guar

gum, xanthan gum, milk proteins, alginates, carrageenans, pectins and the like.

The proportion of concentrated dairy cream, butter-olein and added aqueous phase present in the pre-mix are capable of considerable variation at a fixed fat level. It has been known for many years that the consistency of traditional dairy butter varies throughout the year and that this follows dietary and seasonal variations in the tri-glyceride content of dairy cream. It is however possible to overcome the effect of these variations on product properties by selecting the ratio of cream to butter olein and/or the type of butter olein used, so as to obtain an "N-line" within a predetermined range.

While this N-line may be achieved merely by the use of dairy ingredients as defined above, it is believed possible to add minor proportions of vegetable oil either to fine tune the N-line or to replace a portion of the expensive butterfat. Excellent product properties were obtained when the N-values fell within the range N10:- 30-45, N20:- 5-15, N30:- 0-5.

Before cooling and working, emulsifiers, colouring agents and flavours may be added to the premix. It has been determined that these are optional at high fat levels as the dairy cream and/or the butter olein contain enough natural emulsifiers and flavours to give a good product without the need for these components to be introduced as additives, and the colour of the product is acceptable. At moderate fat levels, (around 60% fat on product) the contribution of the butter olein to flavour is still marked, but at lower fat levels (approaching 40%) addition of flavour becomes desirable. Where emulsifiers and colouring agents are added it has been found convenient to add these to the butter olein used in the preparation of the premix.

In the preffered embodiments of the present invention care should be taken that the pre-mix entering the phase inversion stage of the process has not at any time been subjected to conditions of prolonged high shear, that is if as much of the cooling, and preferably all, is done in static heat exchangers, the olein and whole butter-fat or cream globules present in the pre-mix have not been combined to yield a uniform distribution of tri-glyceride types over the droplets present. It is believed that the presence of droplets of olein in the process flow at this stage facilitates the phase inversion step. It is also observed that, especially in the cream, any inhomogeneity in the distribution of differing tri-glyceride types between the original droplets of the cream has not been markedly effected by the process.

As mentioned above cooling of the pre-mix is preferably carried out in a apparatus which does not expose the throughput to conditions of prolonged moderate or high shear. However, it may prove necessary to expose the premix to a sufficient shear to maintain an emulsion structure, as the pre-mix is in a meta-stable physical state. This is especially true where the pre-mix is prepared in a batch-wise manner, as illustrated below by way of example.

It is preferable to operate the method of the invention as a semi-continuous process, wherein the pre-mix is prepared batchwise and product is prepared continuously from the contents of several pre-mix tanks. We have determined that the method may be realised by the use of cooling coils to accomplish cooling of the premix followed by inversion in a so-called "C-unit" to form a product. The absence of scraped surface heat-exchangers in this processing apparatus greatly simplifies the plant required, as it is no-longer necessary to provide a supply of liquid ammonia to cool these units.

Nevertheless, it is also possible to prepare products according to the present invention on conventional spread production lines.

In order that the invention may be further understood, the following, non-limiting, example is given by way of illustration of the process and the products obtained thereby. The example refers to the accompanying figure, which is a schematic representation of a process line by means of which the present invention may be applied.

The plant comprises cream storage tank (1), supplying 40% dairy cream to heat-exchanger (2), which in turn feeds cooled cream to cream-separating centrifuge (3). During centrifugation, an aqueous fraction of the cream is removed and the retentate concentrated to a fat phase content of 50-70%. After concentration the cream is passed to a further heat-exchanger (4), in which it is Pasteurised before being fed to storage tank (5), where it is held at 60°C prior to further processing. It should be noted that concentrated dairy cream with a 50-70% fat content is available in the marketplace.

Separately from the preparation of the concentrated dairy cream, a butter olein fraction is prepared, suitably by a known method. In the present embodiment of the invention a butter olein fraction obtained by dry-fractionation at a temperature of 15°C was employed. As with the concentrated dairy cream, such materials are available in the marketplace. A water-in-oil promoting monoglyceride emulsifier and the colour were dispersed in the butter olein after heating the butter olein to temperature of 60°C. The resulting butter olein containing mix is held in storage tank (14).

From tanks (5) and (14) the contents are discharged into the pre-mix tank (6), again held at 60°C. The emulsion was maintained without breaking by stirring. Flavour

components were added to the contents of the pre-mix tank.

Separately from the production of the above pre-mix, a waterphase was prepared in water-phase tank 7, by dissolving salt, potassium sorbate and gelatine in water at a temperature of 60°C. A high quality food-grade gelatine was employed ex. Extracto Sweden.

The above-mentioned waterphase was discharged into the pre-mix tank and admixed with the pre-mix prepared according to the preceding steps. The pH of the contents of the pre-mix tank was adjusted to pH 5.01 with lactic acid.

The final composition of the contents of the pre-mix tank (6) was;

55% Cream	43.6%	
Butter Olein	16.6%	
Monoglyceride	0.1%	{emulsifier}
Colour	0.04%	
Gelatine	2.5%	{thickener}
Salt	0.2%	{preservative/taste}
K-sorbate	0.1%	{preservative}
Lactic acid	to pH 5.0	
Water	to 100%	

From the premix tank (6), the premix is pumped into a chiller (8), where it is cooled to an outlet temperature of 13°C.

The premix emerging from the chiller (8) is fed to a C-unit (9) with an outlet temperature of 21°C and thereafter to an A-unit (10) with an outlet temperature of 14°C, at which temperature it is packed.

In order to accommodate break-downs in the packaging apparatus (11), a rework line (12) enabled selective recirculation of the inverted emulsion through a further heat-exchanger (13) to the premix tank (6).

Typical hardness values for the product were obtained according to the method of Haighton et al (J.A.O.C.S 36, 1959, p345) as C-values at the indicated temperatures;

5 Celsius	1500-2000
10 Celsius	950-1300
15 Celsius	350-450
20 Celsius	80-150

Typical N-values for the fat phase used in this example are N10:- 39.6, N15:- 21.0, N20:- 8.5, N25:- 3.8, N30:- 0.7 and N35:- 0.0.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Edible water-in-oil emulsion spread comprising 30-70% wt. of an aqueous phase and butterfat characterized in that the butterfat originates from cream having a fat content in excess of 40% wt. and a dry olein fraction of butterfat only, and the weight ratio of the said cream to the said dry olein fraction is from 1:10 to 10:1.

2. Spread according to claim 1, characterized in that the olein fraction has a melting point of less than 20°C.

3. Spread according to claim 1, characterized in that the olein fraction has a melting point of less than 15°C.

4. Spread according to claim 1, characterized in that the olein fraction has a melting point of less than 10°C.

5. Spread according to any one of the claims 1 to 4, characterized in that the cream has a fat content of at least 60% wt.

6. Spread according to any one of the claims 1 to 5, characterized in that it comprises a gelling or thickening agent.

7. Spread according to claim 6, characterized in that the gelling or thickening agent is selected from the group comprising milk protein, gelatin, locust bean gum, guar gum, xanthan gum, alginates, carrageenans, pectins and combinations of two or more of the same.

AUSTRALIAN PATENT OFFICE

8. Spread according to any one of the preceding claims further comprising a non-milk fat.

9. Process for the preparation of the edible emulsion spread of claim 1, which comprises the steps of a) admixing a butterfat component and a non-dairy aqueous phase, optionally including therein a gelling or thickening agent and

b) working the product of step a) under conditions of sufficient high shear that a stable water-in-oil emulsion with essentially the same composition as the product of step a) results, characterized in admixing dairy cream having a fat content in excess of 40% wt. and dry butter olein in a weight ratio of 1:10 to 10:1 as butterfat component.

DATED THIS 16TH DAY OF JUNE 1993
UNILEVER PLC
By its Patent Attorneys:
GRIFFITH HACK & CO
Fellows Institute of Patent
Attorneys of Australia.

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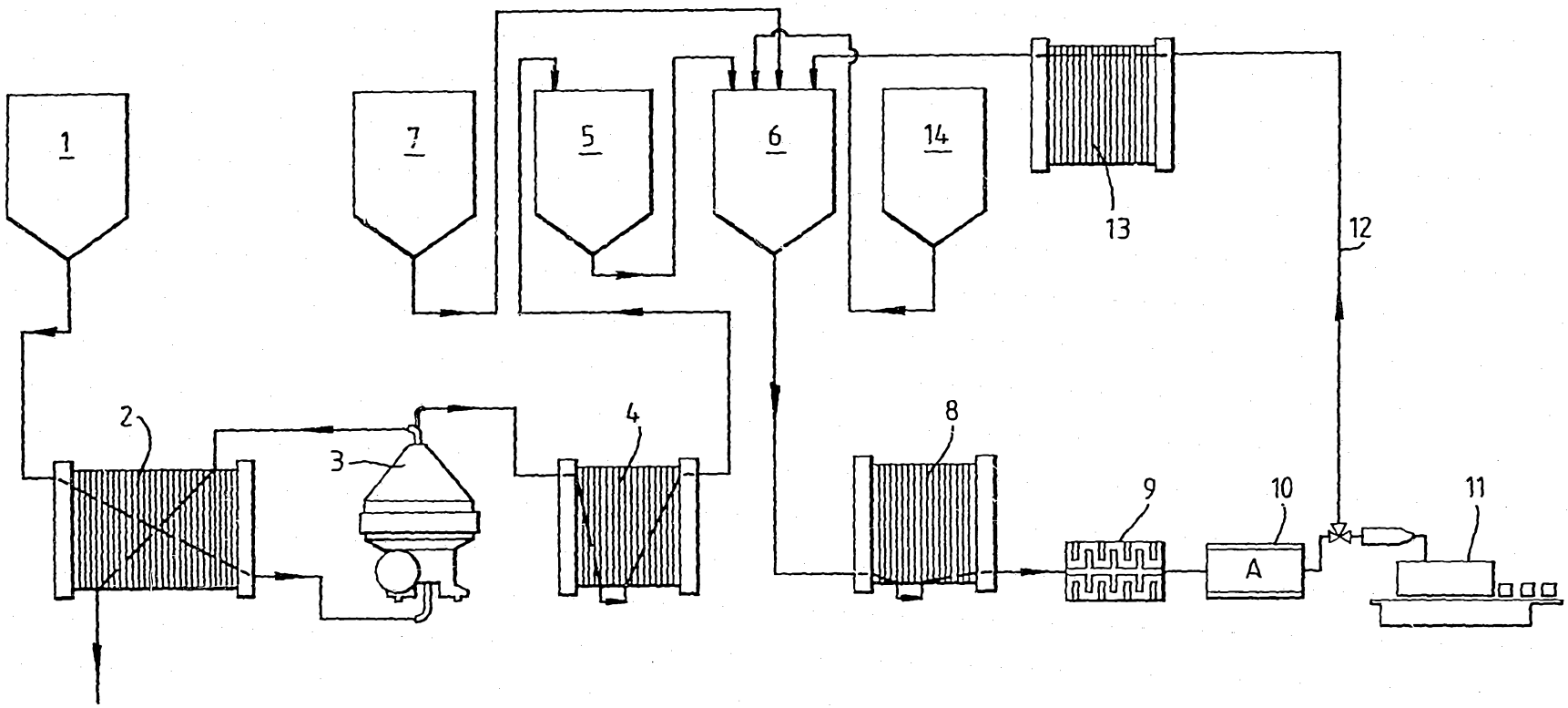
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