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**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES**

E. S. D.

SUPERINDUSTRIA Y COMERCIO

Radicacion : 04043958 00000003 Folio: 5
Fecha (AMB): 2004-09-17 16:43:19
Tramite : 011 PCT-PATENT 379 FASE NACI 444 REPORT:
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

RESPUESTA A OFICIO 05576 DE JUNIO 11, 2004

REF: Expediente No. 04 043.958 – Solicitud de Patente

Entrada en Fase Nacional Corresp. a la Solicitud Internacional PCT/BR02/00150

a favor de MULTIBRÁS S.A. ELETRODOMÉSTICOS

Titulada: PROCESO DE REMOCIÓN DE MANCHAS DE ROPA EN MÁQUINAS
LAVADORAS DE EJE VERTICAL

RAMIRO CASTRO DUQUE, vecino de Bogotá, portador de la tarjeta profesional No. 1003, obrando como apoderado de la sociedad MULTIBRÁS S.A. ELETRODOMÉSTICOS, según lo acredita el documento de poder protocolizado bajo el No. 16619, para dar cumplimiento al requerimiento notificado por fijación en lista el 11 de Junio de 2004, cuyo término fue prorrogado mediante escrito radicado el 04 de Agosto de 2004 y de acuerdo con los Artículos 38 y 39 de la Decisión 486 de la Comisión de la Comunidad Andina, Artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la SIC, me permito allegar:

1. Documento donde consta la cesión del derecho a la Patente otorgado por el inventor al solicitante, debidamente notariado y legalizado ante Cónsul Colombiano, y autenticado ante el Ministerio de Relaciones Exteriores, junto con su correspondiente traducción oficial al castellano.
2. Formas PCT/IB/304, PCT/IB/306, PCT/IPEA/401 y anterioridades relacionadas con la presente solicitud.
3. Extracto para publicación y Tarjeta de Archivo Temático.
4. Artes finales (2 de 12 cm X 12 cm y 1 de 8 cm X 8 cm).

De la señora Jefe atentamente,



RAMIRO CASTRO DUQUE
C.C. No. 170.322 de Bogotá
Código 340
Cra 7 No. 16-56 Piso 9

Bogotá, Septiembre 15, 2004

CHP/MEV/hsr.

(FORMA PI - 12)	
EXTRACTO	
21	04 043.958
22	12-05-2004
31	PI 0105826-6
32	13-11-2001
33	BR
51	
74	RAMIRO CASTRO DUQUE
72	FLAVIO ERASMO BERNARDINO

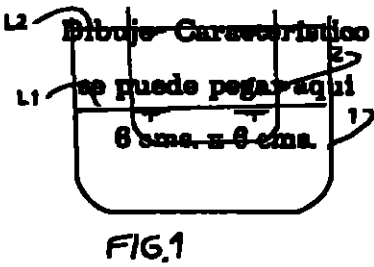


FIG.1

Título No.

Fecha

57)

1. Proceso de remoción de manchas de ropa en máquinas lavadoras de eje vertical constituidas por un tanque (1) que contiene líquido de lavado en al menos un nivel de lavado y un tambor perforado (2) para contener la ropa e interno al tanque (1), caracterizado por comprender las etapas de:

- a. alimentar un líquido de lavado a una carga de ropa, manchada, contenida en el interior del tambor perforado (2), hasta alcanzar un nivel predeterminado, sustancialmente inferior al menor nivel de lavado y compatible con la carga de ropa;

Continúa al respaldo

71 MULTIBRAS S.A. ELETRODOMESTICOS, SAO PAULO, BRASIL

54 TITULO PROCESO DE REMOCION DE MANCHAS DE ROPA EN MAQUINAS LAVADORAS DE EJE VERTICAL

CORTAR POR AQUI

- a- someter la carga de ropa sumergida en el líquido de lavado a por lo menos un período de agitación por un cierto primer intervalo de tiempo de agitación;
- b- mantener la carga de ropa sumergida en el líquido de lavado en reposo después de transcurrido un respectivo período de agitación y durante un primer intervalo de tiempo de reposo predeterminado, suficiente para que la temperatura del líquido de lavado alcance un valor necesario para posibilitar la activación de al menos una de las funciones enzimática y blanqueadora del líquido de lavado;
- c- someter la carga de ropa sumergida en el líquido de lavado a otro período de agitación por un cierto segundo intervalo de tiempo de agitación suficiente para proveer una cierta limpieza de la carga de ropa, pero insuficiente para provocar una caída relevante en la temperatura alcanzada por el líquido de lavado; y
- d- extraer el líquido de lavado de la carga de ropa.

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85

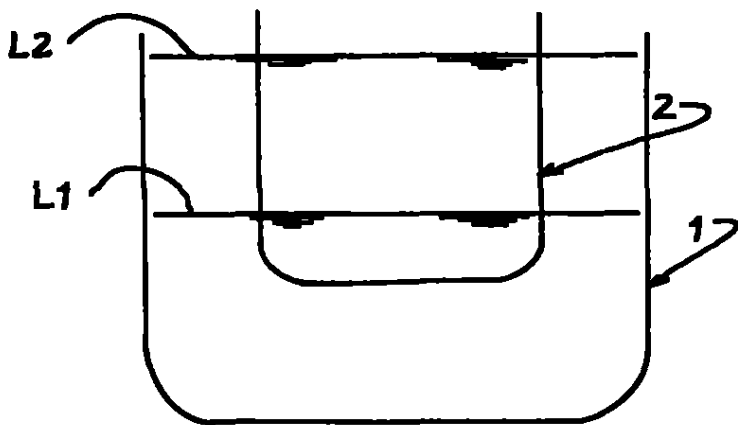


FIG. 1

From the INTERNATIONAL BUREAU

PCT

NOTICE INFORMING THE APPLICANT OF THE
COMMUNICATION OF THE INTERNATIONAL
APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

ARNAUD, Antonio, M., P.
Rua José Bonifácio, 93 - 9th floor
01003-901 São Paulo - SP
BRÉSILDate of mailing(*day/month/year*)
22 May 2003 (22.05.03)Applicant's or agent's file reference
multi-005

IMPORTANT NOTICE

International application No.
PCT/BR02/00150International filing date(*day/month/year*)
08 November 2002 (08.11.02)Priority date(*day/month/year*)
13 November 2001 (13.11.01)

Applicant

MULTIBRÁS S.A. ELETRODOMÉSTICOS

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this notice:

KP, KR, US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EA, EC, EE, EP, ES, FI, GB, GD, GE, GH, GM, GR, HU, ID, IL, IN, IS, JP, KE, KG, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OA, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this notice is a copy of the international application as published by the International Bureau on 22 May 2003 (22.05.03) under No. 03/042447

4. **TIME LIMITS** for filing a demand for international preliminary examination and for entry into the national phase

The applicable time limit for entering the national phase will, subject to what is said in the following paragraph, be 30 MONTHS from the priority date, not only in respect of any elected Office if a demand for international preliminary examination is filed before the expiration of 19 months from the priority date, but also in respect of any designated Office, in the absence of filing of such demand, where Article 22(1) as modified with effect from 1 April 2002 applies in respect of that designated Office. For further details, see *PCT Gazette* No. 44/2001 of 1 November 2001, pages 19926, 19932 and 19934, as well as the *PCT Newsletter*, October and November 2001 and February 2002 issues.

In practice, time limits other than the 30-month time limit will continue to apply, for various periods of time, in respect of certain designated or elected Offices. For regular updates on the applicable time limits (20, 21, 30 or 31 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

For filing a demand for international preliminary examination, see the *PCT Applicant's Guide*, Volume I/A, Chapter IX. Only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination (at present, all PCT Contracting States are bound by Chapter II).

It is the applicant's sole responsibility to monitor all these time limits.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Judith Zahra

Facsimile No.(41-22) 740.14.35

Telephone No.(41-22) 338.91.11

PATENT COOPERATION TREATY

12 FEB 2003

PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

From the INTERNATIONAL BUREAU

To:

ARNAUD, Antonio, M., P.
Rua José Bonifácio, 93 - 9th floor
01003-901 São Paulo - SP
Brazil

Date of mailing (day/month/year) 21 January 2003 (21.01.03)	
Applicant's or agent's file reference multi-005	IMPORTANT NOTIFICATION
International application No. PCT/BR02/00150	International filing date (day/month/year) 08 November 2002 (08.11.02)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 13 November 2001 (13.11.01)
Applicant MULTIBRÁS S.A. ELETRODOMÉSTICOS et al	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk (*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
13 Nove 2001 (13.11.01)	PI 0105826-6	BR	30 Dec 2002 (30.12.02)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 338.87.40	Authorized officer Guido SANVINCENTI Telephone No. (41-22) 338 8293
--	---

PINHEIRO, NUNES, ARNAUD & SCATAMBURLO S/C

INTELLECTUAL PROPERTY

MAURÍCIO TIBAU ARNAUD (1918-1986)
EMÍLIO SCATAMBURLO (1943-1992)

TELEPHONE: (+55-11) 3291-2444

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LUIZ ANTONIO RICCO NUNES
ANTONIO MAURÍCIO PEDRAS ARNAUD
ROBERTO SANTO SCATAMBURLO
CLÁUDIO CALEFFI
PAULO BÉRGIO SCATAMBURLO
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APARECIDA SCATAMBURLO
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MARIA CRISTINA SCATAMBURLO
EDWARD MAX WEIL
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CHRISTINA MARIA HORTA
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IMPORTANT NOTICE

Effective January 1, 2002

NEW PHONE No.: (+55-11) 3291-2444
NEW E-MAIL: pinheironunes@pinheironunes.com.br

April 29, 2003

OUR REF : PT-1112/03

YOUR REF :

Messrs.
MEISSNER, BOLTE & PARTNER
Laplacestraße 5
D-81679 München
DEUTSCHLAND

BY FAX

Confirmation copy follows by Fedex

Re: PCT Preliminary Examination before the EPO of PCT/BR02/00150
International Filing Date: November 8, 2002
Applicant: MULTIBRÁS S.A. ELETRODOMÉSTICOS
Title: "PROCESS FOR REMOVING SPOTS FROM CLOTHES IN LAUNDRY MACHINES
WITH A VERTICAL SHAFT"
Deadline: June 13, 2003

Dear Sirs,

Please find attached two copies of the demand form for requesting the International Preliminary Examination for the above mentioned PCT case, which must be filed and paid no later than June 13, 2003.

We ask you please to inform the EPO, as per our letter attached (PT-1112A/03), that the applicant requests a detailed international preliminary examination for the referenced application.

Please issue the debit note, if possible in US dollar, in the name of:

MULTIBRÁS S.A. ELETRODOMÉSTICOS
Rua Dona Francisca, 6920 - Caixa Postal 267/269
89219-900 - Joinville - SC
Brazil

But, thereafter send it to our care

We would appreciate your confirming receipt of this letter and enclosures.

Very truly yours,

Antonio M. P. Arnaud

AMPA/mcg

PINHEIRO, NUNES, ARNAUD & SCATAMBURLO S/C

INTELLECTUAL PROPERTY

MAURÍCIO TIBAU ARNAUD (1918-1986)
EMÍLIO SCATAMBURLO (1943-1992)

WALDEMAR ALVARO PINHEIRO
LUIZ ANTONIO RICCO NUNES
ANTONIO MAURÍCIO PEDRAS ARNAUD
ROBERTO SANTO SCATAMBURLO
CLÁUDIO CALEFFI
PAULO SÉRGIO SCATAMBURLO
GABRIEL PEDRAS ARNAUD
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MARIANA FERREIRA DE SOUZA
CHRISTINA MARIA HORTA
ODETTE SIRENA
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JOSÉ CARLOS DE LIMA JUNIOR
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IMPORTANT NOTICE

Effective January 1, 2002

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NEW E-MAIL: pinheironunes@pinheironunes.com.br

OUR REF : PT-1112 A/03

YOUR REF :

April 29, 2003

Messrs.
EUROPEAN PATENT OFFICE
International Searching Authority
Beyerstrasse, 34
D-80335 - Munchen
GERMANY

Re: International Preliminary Examination for PCT Application No.: PCT/BR02/00150
International Filing Date: November 8, 2002
Applicant: MULTIBRÁS S.A ELETRODOMÉSTICOS
Title: "PROCESS FOR REMOVING SPOTS FROM CLOTHES IN LAUNDRY MACHINES
WITH A VERTICAL SHAFT"

Dear Sirs,

The applicant respectfully requests the IPEA/EP to conduct a **detailed examination** of the International Application which is the subject of this DEMAND under Article 31 of the PCT, including the issuance of a considered Written Opinion, and providing Applicant with an opportunity and ample time to respond to any negative opinions contained therein.

Very truly yours.


Antonio M.P. Arnaud.

AMPA/mcg



Europäisches
Patentamt

European
Patent Office

Office européen
des brevets

94
20

Einsender / Sender / Expéditeur :

Arnaud, Antonio M.P.
PINHEIRO, NUNES, ARNAUD &
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P.B. 5818 Patenden 2
NL-2280 HV Rijswijk (Z-H)
☎ 070 / 340-2040
Tx 31 851 apo nl
Fax 070 / 340-3016
Gitschiner Straße 103
W-1000 Berlin 61
☎ 030 / 25801-0
Fax 030 / 25801-840

**Bestätigung über den
Eingang nachgereichter
Unterlagen für Patentan-
meldungen/Patente beim
Europäischen Patentamt**

**Acknowledgement of
receipt for subsequently
filed items relating to
patent applications/patents
at the European Patent
Office**

**Accusé de réception à
l'Office européen des bre-
vets de pièces produites
postérieurement au dépôt
d'une demande de brevet/
à la délivrance d'un brevet
européen**

Datum und Ort des Eingangs sind aus
der Perforation dieser Eingangsbestäti-
gung ersichtlich
(M + Datum = Einreichungsort München;
Datum ohne Zusatz = Einreichungsort
Den Haag; Datum + B = Einreichungsort
Berlin)

Date and place of receipt are shown by
the perforation appearing on this receipt
(M + date = Munich as place of receipt;
date alone = The Hague as place of
receipt; date + B = Berlin as place of
receipt)

La date et le lieu de réception sont indi-
qués par la perforation du présent accusé
de réception
(M + date = pièces reçues à Munich;
date seule = pièces reçues à La Haye;
date + B = pièces reçues à Berlin)

Eingereichte Unterlagen

Items filed

Pièces envoyées

Anmeldungs- (und Direktions-) Nr./Patent Nr. Application (and Directorate) No./Patent No. N° de la demande (et de la direction)/n° du brevet	Ihr Zeichen Your reference Votre référence	ggs. Art und Datum der Unterlagen** Nature and date of items (optional)** Nature et date des pièces (facultatif)**
1 PCT/BR02/00150	MULTIBRÁS	FORM 401
2		
3		
4		
5		
6		
7		
8		
9		
10		

* falls bereits bekannt

* if already known

* si déjà connu

** Der Eingang der angegebenen Unterlagen
wird bestätigt.
Enthält diese Spalte keine Eintragungen, so
wird lediglich bestätigt, daß eine Sendung
zu dem angegebenen Aktenzeichen einge-
gangen ist

** The receipt of the items indicated is
confirmed.
If this column does not contain any entries,
it is only confirmed that an item has been
received for the indicated file.

** La réception des pièces indiquées est
confirmée
Faute de mention dans cette colonne, le
présent accusé de réception se rapporte à
une pièce quelconque envoyée sous la
référence indiquée

The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ EPO

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only			
Identification of IPEA		Date of receipt of DEMAND	
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference MULTI - 005	
International application No. PCT/BR02/00150	International filing date (day/month/year) November 8, 2002	(Earliest) Priority date (day/month/year) November 13, 2001	
Title of invention PROCESS FOR REMOVING SPOTS FROM CLOTHES IN LAUNDRY MACHINES WITH A VERTICAL SHAFT			
Box No. II APPLICANT(S)			
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) MULTIBRÁS S.A. ELETRODOMÉSTICOS Avenida Nações Unidas, 12.995, 32º andar 04578-000 São Paulo - SP BRAZIL		Telephone No. (55) (11) 5586-6315	
		Facsimile No. (55) (11) 5586-6474	
		Teleprinter No.	
		Applicant's registration No. with the Office	
State (that is, country) of nationality: BR		State (that is, country) of residence: BR	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) BERNARDINO, Flávio Erasmo Rua Célio Barbosa da Silva, 415 13564-060 - São Carlos - SP BRAZIL			
State (that is, country) of nationality: BR		State (that is, country) of residence: BR	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)			
State (that is, country) of nationality:		State (that is, country) of residence:	
☐ Further applicants are indicated on a continuation sheet.			

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: (Family name followed by given name; for a legal entity, full official designation.
The address must include postal code and name of country.)ARNAUD, Antonio, M.P.;
PINHEIRO, Waldemar Álvaro;
NUNES, Luis Antonio Ricco; and
SCATAMBURLO, Paulo Sérgio - All of Rua José Bonifácio
93 - 9th floor - 01003-901 - São Paulo - SP - Brazil

Telephone No.

(55) (11) 3106-13-77

Facsimile No.

(55) (11) 3106-13-77

Teleprinter No.

Agent's registration No. with the Office

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION

Statement concerning amendments:*

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filedthe description ☐ as originally filed☐ as amended under Article 34the claims ☐ as originally filed☐ as amended under Article 19 (together with any accompanying statement)☐ as amended under Article 34the drawings ☐ as originally filed☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). (This check-box may be marked only where the time limit under Article 19 has not yet expired.)

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English.....

☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

Box No. V ELECTION OF STATES

The applicant hereby elects all eligible States (that is, all States which have been designated and which are bound by Chapter II of the PCT)

excluding the following States which the applicant wishes not to elect:

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | |
|--|---|--------|
| 1. translation of international application | : | sheets |
| 2. amendments under Article 34 | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19 | : | sheets |
| 5. letter | : | sheets |
| 6. other (specify) | : | sheets |

For International Preliminary
Examining Authority use only

received not received

☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐

The demand is also accompanied by the item(s) marked below:

- | | |
|--|---|
| 1. ☒ fee calculation sheet | 5. ☐ statement explaining lack of signature |
| 2. ☐ original separate power of attorney | 6. ☐ sequence listings in computer readable form |
| 3. ☐ original general power of attorney | 7. ☐ tables in computer readable form related to sequence listings |
| 4. ☐ copy of general power of attorney; reference number, if any: | 8. ☒ other (specify): request for detailed examination |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

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(Antonio M.P. Arnaud - Agent)

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DEUTSCHES
PATENTAMT

21 Aktenzeichen: P 39 02 910.7
22 Anmeldetag: 1. 2. 89
23 Offenlegungstag: 2. 8. 90

DE 3902910 A1

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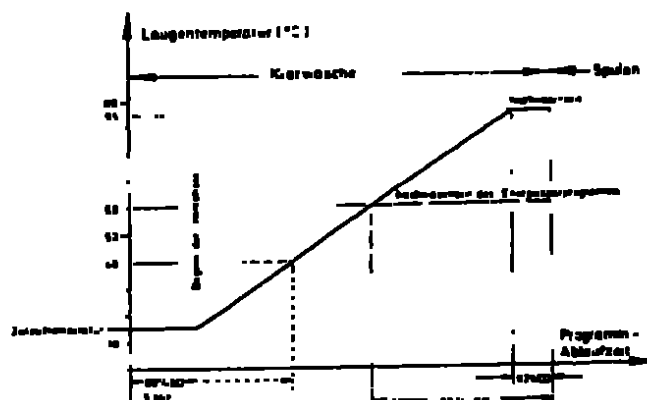
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54 Verfahren zur Programmgestaltung für Waschmaschinen und Vorrichtung zur Durchführung des Verfahrens

Zwecks Optimierung des Waschgangs soll ein der Lau-
gentemperatur angepaßter Wäschetrommel-Reversierbe-
trieb mit unterschiedlicher relativer Einschaltdauer des An-
triebmotors vorgenommen werden. Ein bekanntes Verfah-
ren erhöht unter Beibehaltung der üblichen mittleren relati-
ven Einschaltdauer in der Hochtemperaturphase der Wasch-
lauge dieselbe um einen bestimmten Wert und vermindert
sie gleichzeitig in der Waschlaugeaufheizphase wiederum
um das gleiche Maß.

Beim erfindungsgemäßen Verfahren wird bereits vor Beginn
des Aufheizens, während des Wasserzulaufs, die relative
Einschaltdauer auf ein zufälliges Maximum erhöht und da-
durch die Waschmittel besser aufgelöst, während der Lau-
genaufheizphase in mehreren Stufen reduziert und am Ende
in der sogenannten Nachwaschzeit wiederum kurzzeitig auf
das Maximum oder auf einen etwas unterhalb desselben lie-
genden Wert erhöht.

Das Verfahren dient der Optimierung des Waschgangs bei
Haushalt-Waschmaschinen und zugleich der Minimierung
ihrer Antriebs-Motorengröße.



DE 3902910 A1

Beschreibung

Die Erfindung betrifft ein Verfahren zur Programmgestaltung für Waschmaschinen und eine Vorrichtung zur Durchführung des Verfahrens nach dem Oberbegriff des Anspruchs 1. Sie betrifft insbesondere ein Verfahren zur Optimierung von Normal- und sogenannten Energiespar-Waschprogrammen.

Aus der DE-OS 25 26 470 ist ein "Verfahren und Maschine zum Waschen von insbesondere leichtverschmutzter Wäsche" bekannt. Hierbei ist ein Waschprogramm mit höherer Temperatur in ein Waschprogramm mit verminderter Temperatur und verlängerter Nachwaschzeit umsteuerbar. Die sich durch die verlängerte Nachwaschzeit gegenüber dem Normalprogramm ergebende verlängerte Betriebszeit für den Trommelantriebsmotor erfordert weniger Energie als durch die verminderte Temperatur eingespart wird. Es kann also beispielsweise ein gewähltes Kochprogramm in dem üblicherweise bis auf 95 Grad Celsius aufgeheizt würde in ein Energiesparprogramm geändert werden, in dem beispielsweise mit 60 Grad Celsius gewaschen wird. In Weiterführung des Standes der Technik ist ein aus einem Wasserzulauf-Programmschritt und aus drei Aufheizzschritten auf untere, mittlere und höhere Temperatur mit jeweiligen "Thermostops" bestehendes Klarwaschprogramm in ein Klarwaschprogramm umschaltbar, das aus einem in den Wasserzulauf-Programmschritt verlegten Thermostop mit einer oberen Grenztemperatur und einer sich aus den ausgeblendeten Aufheizzschritten ergebenden, verlängerten Nachwaschzeitstufe besteht.

Eine Thermostop-Funktion verhindert gemäß dem Stand der Technik ein Weiterdrehen der Schaltwalze des Programmschaltwerks während der Aufheizzeit.

Die Wäsche wird in diesem Programmabschnitt in allen Temperaturbereichen unter vollem Betrieb des Motors mit Hilfe sogenannter "Wäschetrommel-Reversierzyklen" hin und her bewegt. Diese langen Laufzeiten können neben einer erhöhten Motorbelastung zu Schädigungen der Wäsche führen.

Des weiteren ist aus der DE-OS 33 19 245 ein "Verfahren zum Erhöhen der Reinigungswirkung bei Wäsche in Waschmaschinen" bekannt. Hierbei wird unter Beibehaltung der mittleren relativen Einschaltdauer des Wäschetrommelantriebs (im Reversierbetrieb) dieselbe in der Hochtemperaturphase der Waschlauge um einen bestimmten Wert verlängert, während die Einschaltdauer in der Aufheizphase der Waschlauge entsprechend um diesen Wert gleichzeitig vermindert wird. Das heißt mit anderen Worten: Die mittlere relative Einschaltdauer des Wäschetrommelantriebs bleibt unverändert. Sie wird lediglich während der Aufheizphase der Waschlauge gegenüber ihrem Ursprungswert abgesenkt und nur in der Hochtemperaturphase der Waschlauge gegenüber dem Ursprungswert erheblich angehoben bzw. in diese verlagert.

Der Erfindung liegt die Aufgabe zugrunde das letztgenannte Verfahren noch weiter zu optimieren und die Reversierzyklen während des Waschganges bei unterschiedlicher relativer Antriebsmotor-Einschaltdauer in Abhängigkeit der Laugentemperatur zu verändern.

Diese Aufgabe, gemäß der Erfindung, wird durch die kennzeichnenden Merkmale des Anspruchs 1 gelöst. Weitere vorteilhafte Ausgestaltungen der Erfindung sind den Unteransprüchen zu entnehmen.

Die durch das erfindungsgemäße Verfahren erzielbaren Vorteile bestehen insbesondere darin, daß sich Waschmittel mit Hilfe dieser gezielten relativen Einschaltdauer-Veränderung besser auflösen und die Waschwirkung sich demzufolge und speziell in Energiesparprogrammen verstärkt und die Wäsche durch geringere Bewegung geschont wird.

Das Verfahren wird anhand eines Laugentemperatur-Zeitdiagramms im folgenden näher erläutert.

Die zuvor erwähnten Wäschetrommel-Reversierzyklen werden mit Hilfe der relativen Antriebsmotor-Einschaltdauer in Prozent bemessen. Aufgrund einschlägiger Vorschriften bezüglich "Nennbetriebsarten" errechnet man die, für den hier vorliegenden "Aussetz-Schaltbetrieb" relative Einschaltdauer (kurz ED %) aus dem Verhältnis von Motoreinschaltzeit zu Motoreinschaltzeit summiert mit der Motorausschaltzeit und durch Multiplikation des Quotienten mit Hundert.

$$\text{Relative Einschaltdauer ED\%} = \frac{\text{Motoreinschaltzeit} \times 100}{\text{Motoreinschaltzeit} + \text{Motorausschaltzeit}}$$

Grundsätzlich werden im erfindungsgemäßen Verfahren zwei verschiedene Reversierzyklen mit einer relativen Einschaltdauer von 80 u. 70% angewandt. Diese relative Einschaltdauer des Trommelantriebsmotors wird in Abhängigkeit von der Laugentemperatur so verändert, daß in Temperaturbereichen in welchen die Waschmittel besonders aktiv sind eine hohe relative Einschaltdauer und in den anderen Temperaturbereichen eine niedrigere relative Einschaltdauer vorherrscht. Zur Verlängerung der Laugen-Einwirkzeit erfolgt bei vorliegender hoher Einschaltdauer in den betreffenden Temperaturbereichen eine Abschaltung der Beheizung.

Gemäß der dargestellten Kurve beginnt der Waschprogrammschritt mit der Wasserzulaufphase. Circa fünf Minuten lang wird die Wäsche in kaltem Wasser mit einer relativen Einschaltdauer von 80% hin und her bewegt. Hierdurch löst sich das eingespülte Waschpulver besser auf und die Waschwirkung wird speziell bei Energiesparprogrammen verstärkt. (Energiesparprogramme waschen, wie eingangs erwähnt, bei niedrigeren maximalen Laugentemperaturen, beispielsweise bei 60 Grad Celsius. Gegenüber Normalprogrammen besitzen sie kürzere Aufheizzeiten und verlängerte Nachwaschzeiten; siehe strichpunktierte Linie in der Skizze). Nach fünf Minuten legt das Programmschaltwerk die Beheizung an Spannung und die Lauge beginnt sich gemäß der dargestellten Aufheizkurve zu erwärmen. Während des Aufheizens wird die Wäsche in mehreren Zeitabschnitten mit längeren Reversierzyklen (hohe relative Einschaltdauer), welchen sich Zeitabschnitte mit den vorerwähnten kurzen Reversierzyklen (geringe relative Einschaltdauer) anschließen, hin und her bewegt. Unterbrochen werden die Reversierzyklen von Motorstillstandspausen.

Wurde vom Benutzer die Energiespartaste für 60 grädige Lauge angewählt, erfolgt bei Erreichen dieser

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Temperatur die sogenannte Nachwaschzeit in welcher für mindestens drei Minuten ununterbrochen mit erhöhter relativer Einschaltdauer (gleich oder größer 75% ED) der Reversierbetrieb vorgenommen wird. Der Reversierbetrieb wird während der Energiesparprogramm-Nachwaschzeit in jedem Fall mit höherer relativer Einschaltdauer als während des normalen Waschgangs vorgenommen. Soll hingegen mit maximaler Laugentemperatur gewaschen werden, verlängert sich die Aufheizzeit und demzufolge erhöhen sich auch die Reversierzyklen-Abschnitte mit geringer relativer Einschaltdauer. In Nähe der maximalen Waschlaugentemperatur (oder auch nach Erreichen derselben) erfolgt nun wiederum ein mindestens dreiminütiger Reversierbetrieb während der jetzt verkürzten Nachwaschzeit mit einer relativen Einschaltdauer von 80% bis zum Beginn des anschließenden Spülgangs.

Der Reversierbetrieb mit der maximalen relativen Einschaltdauer von 80% kann auch noch über den Beginn der Heizphase hinaus bis zu einer Waschlaugentemperatur von gleich oder kleiner 40 Grad Celsius fortgesetzt werden. (In der Skizze gestrichelt angedeutet).

Die Größe des Antriebmotors, d. h. dessen Auslegung für eine mittlere relative Nenn-Einschaltdauer ist abhängig von der maximalen Programmdauer und der maximalen Wäschemenge, d. h. von der Beanspruchung während des Waschprozesses. Hierbei entstehen die größten Belastungen für die der Antriebsmotor dimensioniert werden muß. Da beim erfindungsgemäßen Verfahren die mittlere relative Einschaltdauer gesenkt wurde, kann ein Antriebsmotor, der zwar höhere Spitzenlasten, jedoch geringere Dauerlasten zu erzeugen im Stande ist zum Einsatz kommen. (Das heißt ein kleinerer Motor mit hohem Drehmoment, jedoch mit niedrigerer relativer Einschaltdauer). Versuche haben ergeben, daß ein Antriebsmotor mit einer relativen Nenn-Einschaltdauer von 70% diesen Anforderungen genügt. (Die verhältnismäßig kurzzeitige Überlastung von 10% während der Waserzulaufphase bzw. während der Nachwaschzeit kann er thermisch ohne weiteres verkraften).

Die Änderung der relativen Einschaltdauer im Reversierbetrieb des Waschgangs kann durch eine zeitabhängige Motoransteuerung vom Programmschaltwerk selbst vorgenommen werden.

Patentansprüche

1. Verfahren zur Programmgestaltung für Waschmaschinen mit einer motorisch angetriebenen Wäschetrommel in der das Waschgut in einer Waschlauge durch reversierendes Antreiben der Wäschetrommel in der Art hin und her bewegt wird, daß die relative Einschaltdauer des Antriebmotors durch eine zeitliche Steuerung in Abhängigkeit von der Laugentemperatur veränderbar ist, dadurch gekennzeichnet, daß vor der Waschlaugenaufheizphase im Programmschritt "Klarwäsche", d. h. bei Wasser mit Zulaufentemperatur, der Reversierbetrieb zunächst mit einer relativen Einschaltdauer von größer als 75% vorgenommen wird und daß während der Waschlaugenaufheizphase der Reversierbetrieb mit einer geringeren relativen Einschaltdauer als 75% vorgenommen wird.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß am Ende der Waschlaugenaufheizphase, während einer sogenannten Nachwaschzeit ebenfalls mit einer relativen Einschaltdauer von größer als 75% reversiert wird.

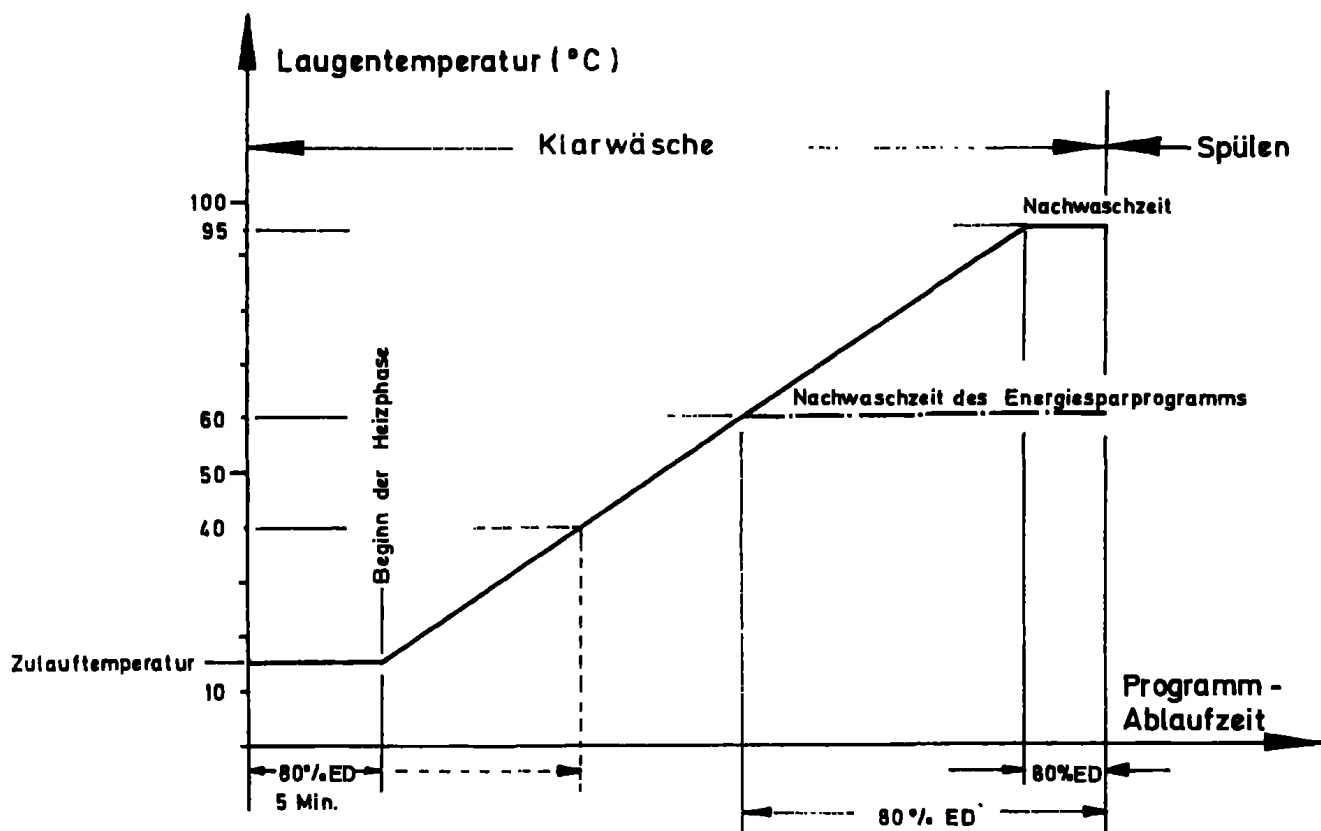
3. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Reversierbetrieb bei einer relativen Einschaltdauer von größer 75% zu Beginn der Waschlaugenaufheizphase bis zu einer Waschlaugentemperatur von 40° C vorgenommen wird.

4. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Reversierbetrieb mit der relativen Einschaltdauer von größer 75% während einer Dauer von 3 bis 20 Minuten vorgenommen wird.

5. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Beheizung der Waschmaschine bei Reversierbetrieb mit der relativen Einschaltdauer von größer 75% abgeschaltet wird.

6. Vorrichtung zur Durchführung des Verfahrens nach Anspruch 1, dadurch gekennzeichnet, daß im Programmschaltwerk Mittel zur Veränderung der relativen Einschaltdauer für den Reversierbetrieb sowie zur Änderung der Waschlaugentemperatur vorgesehen sind.

Hierzu 1 Seite(n) Zeichnungen



Numer: DE 30 02 910 A1
 Int. Cl. 5: D 06 F 33/02
 Offenlegungstag: 2. August 1990



Europäisches Patentamt
European Patent Office
Office européen des brevets



Veröffentlichungsnummer: **0 501 240 A1**



EUROPÄISCHE PATENTANMELDUNG

Anmeldenummer: 92102396.6

Int. Cl.⁵: D06F 35/00

Anmeldetag: 13.02.92

Priorität: 23.02.91 DE 4105760

Veröffentlichungstag der Anmeldung:
02.09.92 Patentblatt 92/36

Benannte Vertragsstaaten:
DE FR GB IT

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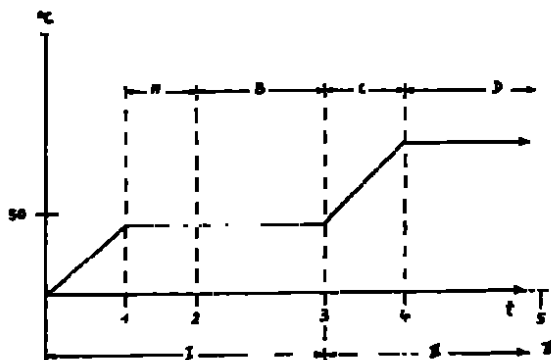
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Verfahren zum Waschen von Wäsche in einer programmgesteuerten Waschmaschine.

Verfahren zum Waschen von Wäsche in einer programmgesteuerten Waschmaschine mit einer in einem Laugenbehälter umlaufenden Wäschetrommel und einer Einrichtung zum automatischen Dosieren und Zuführen von vorzugsweise pumpbaren Waschmittel-Komponenten, bei der der Waschprozeß in eine Vorwasch- bzw. Einweichphase (I), eine Waschphase (II) und eine Spülphase (III) aufgeteilt ist und die Waschphase (II) sich aus einem Aufheiz-Zeitabschnitt (C) für die Waschflotte und einem Nachwasch-Zeitabschnitt (D) zusammensetzt. Um die Wirksamkeit der Waschmittel-Komponenten weiter zu verbessern, wird in der Vorwasch- bzw. Einweichphase (I) die Wäsche während eines Zeitabschnittes (A) einer hohen Waschmechanik und während eines Zeitabschnittes (B) einer geringen Waschmechanik ausgesetzt. Der Zeitabschnitt (B) mit der geringeren Waschmechanik ist gegenüber dem Zeitabschnitt (A) mit der höheren Waschmechanik von längerer Dauer. Nach Beendigung des Zeitabschnittes (B) mit der geringeren Waschmechanik beginnt der Aufheiz-Zeitabschnitt (C) zum Errei-

chen einer vorgewählten bzw. programmspezifischen Waschflottentemperatur. Während dieses Aufheiz-Zeitabschnittes (C) werden die Waschmittel-Komponenten für die Waschphase (II) zugeführt.



EP 0 501 240 A1

Die Erfindung betrifft ein Verfahren zum Waschen von Wäsche nach dem Oberbegriff des Patentanspruchs 1.

Aus der DE-A-32 37 785 ist es bekannt, die Wasch- und Waschhilfsmittel bei einer Waschmaschine in Komponentenform zu bevorraten und mittels einer Dosiervorrichtung in abgemessenen Mengen zu bestimmten Zeitpunkten den jeweiligen Waschphasen eines Waschprozesses zuzuführen. Die Reinigungswirkung der Waschmittel-Komponenten wird hierbei jedoch in jeder Waschphase des Waschprozesses noch nicht optimal ausgenutzt, so daß hier durchaus noch wesentliche Verbesserungen zu erzielen sind.

Ausgehend von diesem Stand der Technik liegt der Erfindung nun die Aufgabe zugrunde, das Verfahren zum Waschen von Wäsche in programmgesteuerten Waschmaschinen der in Rede stehenden Art so weiter zu verbessern, daß die waschaktiven Substanzen der einzelnen Waschmittel-Komponenten in jeder Waschphase eines Waschprozesses auch voll wirksam werden können und damit auch restlos ausgenutzt werden.

Die Lösung dieser Aufgabe gemäß der Erfindung ist dem kennzeichnen den Teil des Patentanspruchs 1 zu entnehmen.

Vorteilhafte weitere Ausgestaltungen des Verfahrens nach der Erfindung sind in den Unteransprüchen angegeben.

Durch die Erfindung wird erreicht, daß die Waschmittel-Komponenten unabhängig voneinander bei ihrer optimalen Wirkungstemperatur dem Laugenbehälter und damit dem Waschgut zugeführt werden und daß diesen bei den entsprechenden Temperaturen auch eine ausreichende Zeitdauer der Einwirkung auf das Waschgut zur Verfügung steht.

Ein Ausführungsbeispiel der Erfindung wird anhand eines Arbeitsdiagramms nachfolgend näher beschrieben.

Wie das Arbeitsdiagramm zeigt, besteht ein kompletter Waschprozeß in der Regel aus einer Vorwasch- bzw. Einweichphase I mit niedriger Temperatur, einer Waschphase II (Hauptwäsche) mit höherer Temperatur und einer die Waschphase II abschließenden Abkühlungs-, Spül- und Schleuderphase III. In der Vorwasch- bzw. Einweichphase I steigt die Temperatur der Waschflotte von Kalt bis nahezu 50° C, Zeitpunkt 1, an. Zweckmäßig ist es, diese Temperatur auf etwa 30 bis 40° C zu begrenzen. Während dieser Vorwasch-Aufheizzeit werden der Waschflotte zunächst diejenigen Waschmittel-Komponenten zugegeben, welche bei niedriger Temperatur bereits ihr Wirkungsoptimum erreichen. Solche Waschmittel-Komponenten sind z. B. Wasserenthärtungsmittel und enzymhaltige Einweichmittel. Diese niedrige Temperatur wird eine gewisse Zeitdauer beibehalten. Während die-

ser Zeitdauer werden z. B. Eiweißverschmutzungen aus dem Waschgut herausgewaschen. Ab dem Zeitpunkt 3 wird die Waschflotte auf die Höchst- bzw. Waschtemperatur aufgeheizt, die beim Zeitpunkt 4 erreicht ist und bis zum Ende des Zeitpunktes 5 auch beibehalten wird.

Die Vorwasch- bzw. Einweichphase I ist nun in vorteilhafter Weise in einen Zeitabschnitt A mit hoher Mechanik und in einen Zeitabschnitt B mit geringerer Mechanik aufgeteilt. Unter Mechanik wird dabei die mechanische Bearbeitung des Waschgutes in der Waschflotte durch Bewegen der Wäschetrommel in wechselnder Drehrichtung verstanden. Der Zeitabschnitt A beginnt dabei mit Erreichen der Vorwaschtemperatur beim Zeitpunkt 1 und endet beim Zeitpunkt 2, bei dem dann der Zeitabschnitt B beginnt, der beim Zeitpunkt 3 mit Beginn des Aufheizens auf die Höchst- bzw. Waschtemperatur endet.

Das Verfahren zum Waschen von Wäsche in einer programmgesteuerten Waschmaschine mit einer in einem Laugenbehälter umlaufenden Wäschetrommel und einer Einrichtung zum automatischen Dosieren und Zuführen von vorzugsweise pumpbaren Waschmittel-Komponenten wird nun zweckmäßig in der Weise durchgeführt, daß das Waschgut in der Vorwasch- bzw. Einweichphase I während des Zeitabschnittes A einer hohen Mechanik und während des Zeitabschnittes B nur einer geringen Waschmechanik ausgesetzt wird. Der Zeitabschnitt B mit der geringen Waschmechanik ist dabei gegenüber dem Zeitabschnitt A mit der höheren Waschmechanik von längerer Zeitdauer. Als Zeitdauer für den Zeitabschnitt A mit der hohen Waschmechanik sind etwa 5 bis 15 Minuten vorgesehen. Die Zeitdauer für den Zeitabschnitt B mit der geringeren Waschmechanik liegt dabei wesentlich über der Zeitdauer des Zeitabschnittes A mit der hohen Waschmechanik. Die Zeitdauer kann hierbei eine bis mehrere Stunden betragen.

Die hohe Waschmechanik bei diesem Verfahrensschritt ist dadurch gekennzeichnet, daß die Wäschetrommel während des Zeitabschnittes A mehr als 50 % (> 50 %) der Zeitdauer in wechselnder Drehrichtung bewegt und während der restlichen Zeitdauer im Stillstand gehalten wird. Beim Zeitabschnitt B für die geringere Waschmechanik liegt dagegen die Bewegungs-Zeitdauer der Wäschetrommel unter 50 % (< 50 %), vorzugsweise bei 1 bis 10 %. Der Zeitabschnitt B mit der geringeren Waschmechanik kann vom Benutzer in vorteilhafter Weise zusätzlich zur üblichen Waschprogramm-Einstellung angewählt und damit eingestellt werden. Nach Beendigung des Zeitabschnittes B mit der geringeren Waschmechanik beginnt in der Aufheiz-Zeitabschnitt C zum Erreichen einer vorgewählten bzw. programmspezifischen Waschflottentemperatur, die bis zum Zeit-

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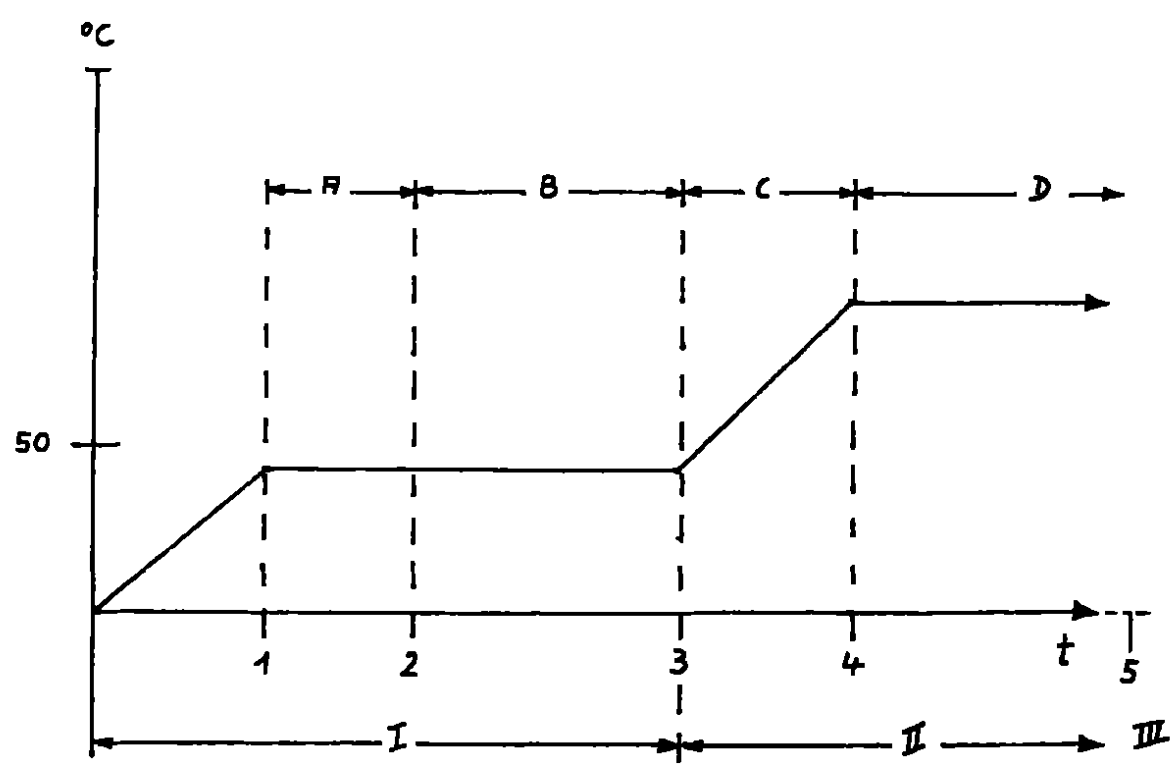
punkt 5 gehalten wird. Ab dem Zeitabschnitt C wird mit einer dem gewählten Grundprogramm entsprechenden Waschmechanik weitergewaschen. Während des Aufheiz-Zeitabschnittes C werden die Waschmittel-Komponenten (Bleichmittel und/oder waschaktive Substanzen, sogenannte Tenside) für die Waschphase II der Waschflotte zugeführt, die dann im Nachwasch-Zeitabschnitt D ihre volle Wirksamkeit entfalten können oder die die Wirksamkeit der für Abschnitt A und B zugeführten Waschkomponenten (z. B. Enzyme) hätten herabsetzen können.

Patentansprüche

1. Verfahren zum Waschen von Wäsche in einer programmgesteuerten Waschmaschine mit einer in einem Laugenbehälter umlaufenden Wäschetrommel und einer Einrichtung zum automatischen Dosieren und Zuführen von vorzugsweise pumpbaren Waschmittel-Komponenten, bei der der Waschprozeß in eine Vorwasch- bzw. Einweichphase (I), eine Waschphase (II) und eine Spülphase (III) aufgeteilt ist und die Waschphase (II) sich aus einem Aufheiz-Zeitabschnitt (C) für die Waschflotte und einem Nachwasch-Zeitabschnitt (D) zusammensetzt, dadurch gekennzeichnet, daß in der Vorwasch- bzw. Einweichphase (I) die Wäsche während eines Zeitabschnittes (A) einer hohen Waschmechanik und während eines Zeitabschnittes (B) einer geringen Waschmechanik ausgesetzt wird und der Zeitabschnitt (B) mit der geringeren Waschmechanik gegenüber dem Zeitabschnitt (A) mit der höheren Waschmechanik von längerer Dauer ist und daß nach Beendigung des Zeitabschnittes (B) mit der geringeren Waschmechanik der Aufheiz-Zeitabschnitt (C) zum Erreichen einer vorgewählten bzw. programmspezifischen Waschflottentemperatur mit programmspezifischer Waschmechanik beginnt und daß während dieses Aufheiz-Zeitabschnittes (C) die Waschmittel-Komponenten für die Waschphase (II) zugeführt werden.
2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Zeitabschnitt (A) mit der hohen Waschmechanik nach Erreichen der Vorwasch- bzw. Einweichtemperatur beginnt.
3. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß als Zeitdauer für den Zeitabschnitt (A) mit der hohen Waschmechanik etwa 5 bis 15 Minuten vorgesehen sind.
4. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Zeitdauer für den

Zeitabschnitt (B) mit der geringeren Waschmechanik wesentlich über der Zeitdauer des Zeitabschnittes (A) mit der hohen Waschmechanik liegt.

5. Verfahren nach Anspruch 1 oder 4, dadurch gekennzeichnet, daß der Zeitabschnitt (B) mit der geringeren Waschmechanik zusätzlich zur Waschprogrammeinstellung wählbar ist.
6. Verfahren nach Anspruch 1 oder einem der folgenden, dadurch gekennzeichnet, daß die Temperatur der Waschflotte während der Vorwasch- bzw. Einweichphase (I) auf max. 50° C., vorzugsweise auf etwa 30 bis 40° C begrenzt wird.
7. Verfahren nach Anspruch 1 oder 4, dadurch gekennzeichnet, daß für den Zeitabschnitt (B) mit der geringeren Waschmechanik mehrere Stunden vorgesehen sind.
8. Verfahren nach Anspruch 1 oder einem der folgenden, dadurch gekennzeichnet, daß die Wäschetrommel während des Zeitabschnittes (A) mehr als 50 % der Zeitdauer und während des Zeitabschnittes (B) weniger als 50 %, vorzugsweise 1 bis 10 % der Zeitdauer in wechselnder Drehrichtung bewegt wird.



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Europäisches
Patentamt

EUROPÄISCHER RECHERCHENBERICHT

Nummer der Anmeldung

EP 92 10 2396

EINSCHLÄGIGE DOKUMENTE			
Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der zugehörigen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int. Cl. 5)
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A	" Seite 1, Spalte 1, Zeile 14 - Spalte 2, Zeile 3 " " Seite 2, Spalte 2, Zeile 18 - Seite 3, Spalte 1, Zeile 40; Abbildung 2 "	5, 6	
Hier vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt			RECHERCHIERTE SACHGEBIETE (Int. Cl. 5)
			D06F
Recherchenort		Abschließendes der Recherche	
DEN HAAG		20 MAI 1992	
Preis		COURRIER G. L. A.	
KATEGORIEN DER GENANNTEN DOKUMENTE			
X : von besonderer Bedeutung allein betrachtet Y : von besonderer Bedeutung in Verbindung mit einer anderen Veröffentlichung derselben Kategorie A : technologischer Hintergrund O : schriftliche Offenbarung P : Zwischenliteratur I : der Erfindung zugrunde liegende Theorien oder Grundlagen E : älteres Patentschriftstück, das jedoch erst am oder nach dem Anmeldetermin veröffentlicht worden ist D : in der Anmeldung angeführtes Dokument L : aus anderen Gründen angeführtes Dokument * : Mitglied der gleichen Patentfamilie, überbestimmendes Dokument			

EPO FORM 150 (01.01.1992)

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 722 008 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.07.1996 Bulletin 1996/29

(51) Int. Cl.⁶: D06F 35/00, A47L 15/46

(21) Application number: 95120402.3

(22) Date of filing: 22.12.1995

(84) Designated Contracting States:
DE ES FR GB IT

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(30) Priority: 05.01.1995 IT PN950002

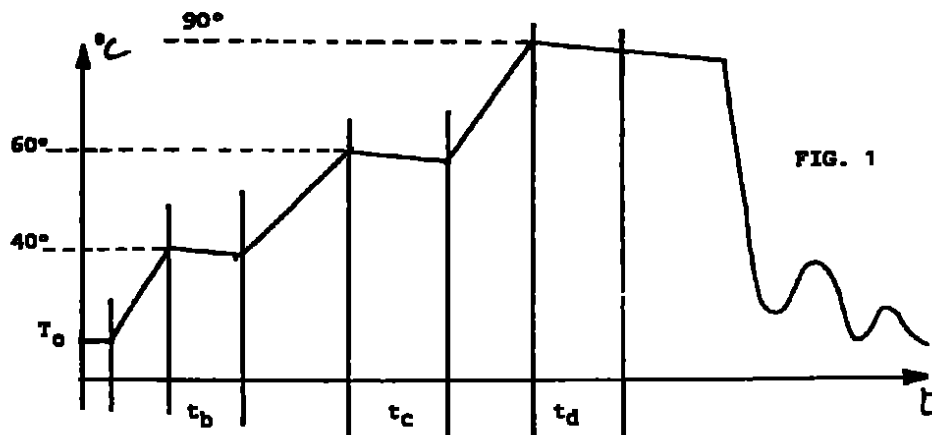
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(54) Improvement in the washing programmes of clothes washing or dishwashing machines

(57) Clothes washing or dishwashing machine provided with a washing vessel, a heating element for heating up the liquor in said vessel, a sensor means for detecting the temperature of said liquor, a control and actuating apparatus connected to the various functional parts and sensors of the machine, said apparatus being adapted to trigger and control a plurality of washing programmes which differ from each other at least for the fact that each programme defines the attainment of a highest temperature value of the liquor in the vessel which is anyhow different from the highest temperature value attain-

able in the other programmes, said machine being also provided with means adapted to automatically cut out the power supply to said heating element for a determined period of time whenever the temperature of the liquor in the vessel reaches at least a pre-determined value below the highest attainable temperature value, wherein said at least a pre-determined value may be a plurality of different temperature values that can be selectively pre-determined for each washing programme.



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Description

The present invention refers to a clothes washing or dishwashing machine, in particular of the household type, which is provided with an appropriate electric circuit that, when associated with a timer means, enables a plurality of programmes to be set which differ from each other for their highest attainable temperature, wherein the rising phase of the temperature of the wash liquor can be interrupted selectively for a pre-determined time interval.

Clothes washing and dishwashing machines are known in the art the operation of which is controlled by wash cycle programming means, said cycle usually comprising at least a wash liquor heating-up phase, a wash liquor temperature holding phase, wherein said two phases are carried through when the washload holding drum is rotating regularly, and a final series of rinsing and spin-extraction phases.

Clothes washing or dishwashing machines are in particular known which are provided with a so-called "thermogradual" system for controlling the temperature of the wash liquor, such a system consisting in allowing one or more temperatures to be reached by energizing the heating element during one or more defined periods through appropriate configurations of the circuits and the programme sequence control switch.

It is however widely appreciated that such a solution, although it has actually been able to find a wide application owing to its simple concept, its reliability and its low cost, does not enable optimum temperatures to be attained for any given washing programme selected by the user, since the final temperature reached by the washing liquor depends not only on the time during which the heating element is kept energized and the power input rating of such an element, but also on the initial temperature of the liquor and, more generally, the heat capacity and the heat loss characteristics of the whole lot of elements involved, such characteristics being usually unknown quantities and likely to be subject to variations within quite wide limits.

In view of making washing programmes to more strictly comply with the actual requirements of use, it is also a known technique, eg. from the patent specification FR 1.235.659, to enable the length of the washing time to be modified at will through the provision of additional timing means. Such a solution, however, gives only the possibility of modifying the washing time at constant temperature, but does not allow for any additional phases at pre-determined temperatures, differing from the nominal washing temperature, to be carried out within the same programme.

The constant search for performance capabilities increasingly adapted to suit evolving consumers' needs requires now to ensure the availability of washing programmes in which the temperature of the washing liquor can be controlled in a more effective manner, considering the varying capacity of removing dirt and stains of

different nature and origin as a function of the attained temperature.

To this purpose, machines have been developed in which the temperature of the washing liquor is measured directly by specially provided temperature sensors through which the washing programme is controlled and adjusted.

However, all such types of machines, which are known in the art under the denomination of "thermostop" machines, share the characteristic that the ultimate, steady-state temperature of the washing liquor is reached with a single temperature-rise ramp.

In the description given below, the case of a clothes washing machine is specifically dealt with for mere reasons of simplicity, but it will be appreciated that what is described and claimed therein applies similarly to a dishwashing machine.

Since it has been experimentally demonstrated, and it is also a widely known fact, that certain types of stains or fatty soil are removed more effectively at certain temperatures rather than other ones, (in particular, it is a widely diffused prejudice, albeit among consumers and not among those who are skilled in the art, that, all other process conditions being equal, the higher the washing temperature, the better the washing result), it ensues that with a simple "thermostop" type of operation the optimum temperature required to remove certain types of stains, if lower than the highest programmed temperature, is certainly reached, but also almost immediately exceeded.

For instance, protein-based, enzyme-removable stains and soil should be handled at temperatures which are below 40°C, whereas other kinds of soil may require washing at temperatures above 60°C for best removal results, and certain types of particularly tenacious stains, such as for instance those originated by substances of some vegetable or synthetic nature, are most effectively dealt with at temperatures of approx. 90°C. As a result, if the same washing bath, and therefore a single washing temperature, is used according to the known technique, an immediate consequence will be that the effectiveness with which soil is actually removed from certain items in the washload turns out to be unavoidably and definitely impaired.

In order to improve such a situation it is a known technique, eg. from the Italian patent application no. PN92A000081 filed by the same applicant, to provide a clothes washing machine provided with a plurality of washing programmes differing from each other for the highest attainable temperature in each one of them. The above cited patent application also discloses the teaching of providing said washing machines with an arrangement adapted to control the duration of the washing phase at the programmed temperature.

However, if such a solution is effective in enabling the afore described situation to be improved in the sense that the washing performance can actually be optimized for a particular type of soil, and therefore the dwelling time of the washing bath at the pre-selected temperature

can actually be adjusted in accordance with the degree of soil in the washload, the same does not enable the problem to be solved in the more usual and general case of a mixed washload in terms of both types of fabrics and types of soil and stains, in the afore explained sense, contained therein, since it will be readily appreciated that such a kind of washing machine is able to each time handle in an optimum manner only soil of a given type, while just handling poorly, or less satisfactorily, all other types of soil with different properties in the washload.

It therefore would be desirable, and it is actually a main purpose of the present invention, to provide a clothes washing machine provided with at least a washing programme which is adapted to handle in an optimum manner, at appropriately differentiated temperatures, all kinds of soil that may be present in a washload, and that may require different washing temperatures for their effective removal, using the most simple and reliable means, the most cost-effective components and most readily available techniques to such a purpose.

The invention will be more clearly understood from the description which is given below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1 is a diagram showing graphically the evolution of the temperature of the washing bath according to a definite washing programme of a washing machine according to the present invention;
- Figure 2 is a diagram showing an example of the same graphical representation of Fig. 1, but referred to a different washing programme of the same washing machine;
- Figure 3 is a view of another example of graphical representation of the evolution of the temperature of the washing bath according to a third washing programme performed by the same washing machine according to the present invention.

The general term "water" will be used in the following description to indifferently mean both washing liquor and rinse water. However, such a simplification will not affect the intelligibility of the exposure to any extent, owing to the context in which said term is actually used, as anyone skilled in the art will readily appreciate.

In order to give the user the possibility of adjusting the duration of the washing action at various temperatures in view of optimizing the effectiveness with which the different types of soil in the washload are going to be dealt with, the present invention substantially relies on creating the possibility of introducing, both during the heating-up phase and the washing phase at the highest pre-set temperature, one or more time intervals which are caused to start when the temperature reaches a pre-determined value and during which the power supply to the heating element is cut off. According to such a mode of operation, the machine goes therefore on with the

washing process, in particular keeping its washload-holding drum rotating regularly, while the power supply to the heating element is restored after each one of said time intervals, so that the washing programme can go on regularly until its end.

In practice, this enables washing phases at substantially constant temperature to be introduced in the programme, so as to be able to deal in a selective manner with the various types of soil in the washload during a pre-determined period of time, said phases being situated at temperature levels which are of course lower than the level of the highest pre-set temperature and are aimed at handling the type of soil in the washload that is more effectively removed at each one of said temperatures.

With reference to a more general case and the illustration appearing in Figure 1, an embodiment of the present invention is explained below along with the related operating principle.

Figure 1 illustrates a graphical representation of the evolution of the washing liquor temperature in a 90°C washing programme.

Such a temperature evolution can be derived from said diagram for state-of-art machines by completely eliminating the time intervals indicated with the references t_b , t_c , t_d on the abscissa, so that a single temperature rise phase would be obtained forming a single, straight temperature rise ramp from the initial value T_0 through to the final value at 90°C, without any dwelling time at the intermediate values of 40°C and 60°C.

According to the present invention, on the contrary, a plurality of intervals of a pre-determined duration t_b , t_c , t_d are planned to occur during the programme in an irregular succession, such intervals being in fact planned to start when the temperature of the washing liquor reaches respective values of 40°C, 60°C and 90°C. During these intervals the heating element provided to heat-up the washing liquor is de-energized, so that the programme, upon reaching said temperature values, undergoes a double effect: on the one hand there is a corresponding extension of the washing time, while this extension of the washing time is on the other hand is obtained by enabling the temperature to dwell exactly at the desired level which has been appropriately selected to cope with the type of soil which is particularly sensitive to and is best removable at precisely that temperature.

Figures 2 and 3 illustrate on the contrary the evolution of the temperature of the washing liquor when a 60°C and 40°C washing programme according to the present invention is set, respectively. Such graphical representations are quite readily and easily inferable and understandable by those who are skilled in the art, since they are the respective partializations of the diagram appearing in Figure 1, so that they do not need any further explanation.

A whole series of advantageous improvements of the present invention consists in providing the ability of defining, through appropriate control means adapted to be activated directly by the user, both the temperature or

the temperatures at which said washing phases at substantially constant temperature are to occur and the duration thereof. Furthermore, the duration of each one of said intervals is adapted to be adjusted either individually for each temperature or in a common manner for all working temperatures reached in said intervals. Finally, in view of conferring the greatest possible extent of flexibility and, at the same time, simplicity to the machine, the duration of said intervals may be adapted to be adjusted either in a continuous manner or at fixed increments corresponding to discrete values.

It has been also found experimentally that, in order to further improve the washing performance of the machine, it is appropriate for the drum to be adapted to be driven at rotational speeds differing from the regular one during said washing phases at substantially constant temperature, so that the synergic effect of an intermediate washing action at a particular temperature for a pre-determined period of time, and at a rotating speed of the drum appropriately adjusted to suit that combination of programme, time and temperature, is actually able to ensure the best possible washing results.

Even in this case the practical implementation of the corresponding circuits is well within the capability of those skilled in the art, since the same triggering signal coming from the thermostat, apart from de-energizing the heating element, can be used to start an appropriate timing device and, at the same time, send an appropriate control command to the drum driving means. At the end of the interval, said timing device can cause the heating element to be again energized and the formerly interrupted washing programme to be resumed by restoring regular operating conditions of the drum.

The methods required to technically obtain such variants are anyway known in the art and can be readily implemented by those skilled in the art.

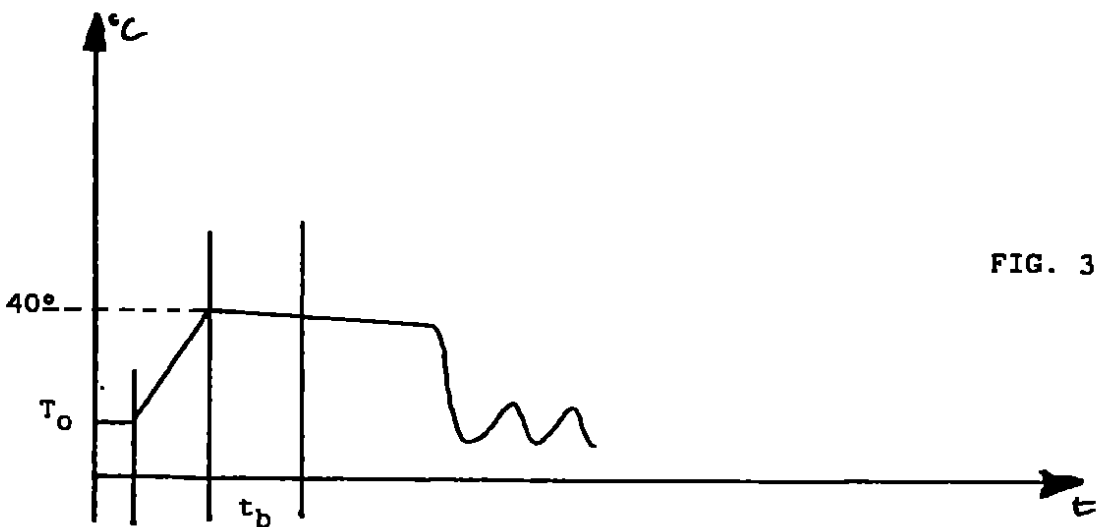
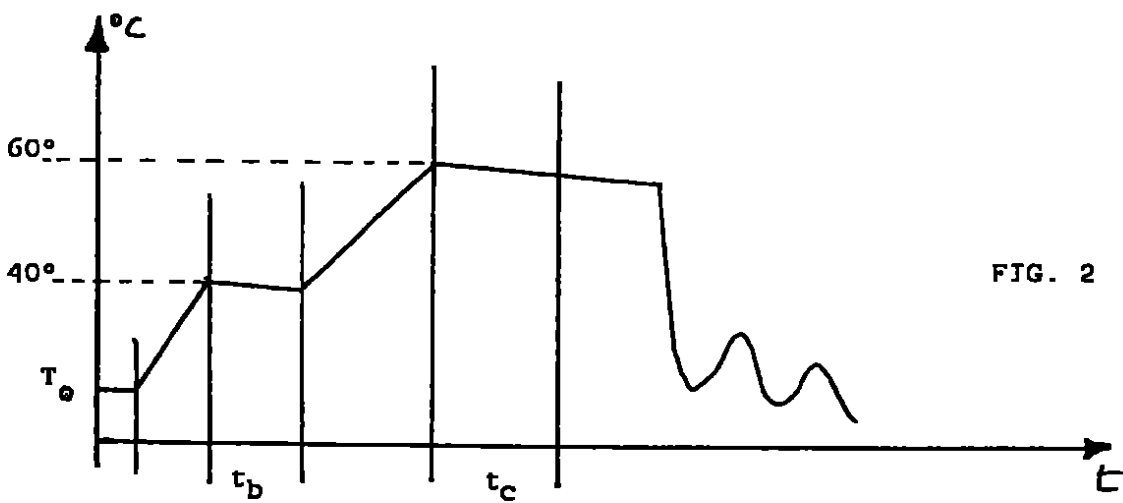
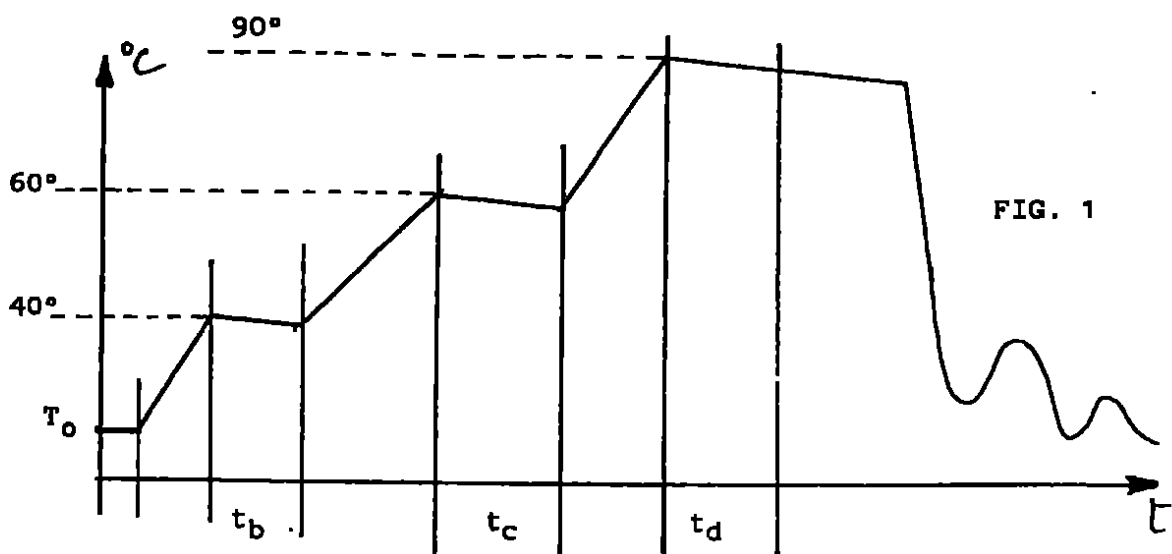
Claims

1. Clothes washing or dishwashing machine provided with a washing vessel, at least a drum rotatably arranged in said washing vessel and adapted to hold the washload, a heating element for heating up the liquor in said vessel, at least a sensor means for detecting the temperature of said liquor, a control and actuating apparatus, electric circuits connecting said apparatus with the various functional parts and sensors of the machine, said apparatus being adapted to trigger and control a plurality of washing programmes which differ from each other at least for the fact that each programme defines the attainment of a highest temperature value of the liquor in the vessel which is anyhow different from the highest temperature value attainable in the other programmes, characterized in that means are also provided adapted to automatically cut off the power supply to said heating element for a determined period of time whenever the temperature of the liquor in the vessel, during the heating-up phase,

reaches at least a pre-determined value below the highest temperature value attainable in the particular washing programme selected, and to automatically restore the power supply to said heating element at the end of said period of time.

2. Washing machine according to claim 1, characterized in that said at least a pre-determined value may be a plurality of different temperature values, wherein said plurality of different temperature values and the respective length of the period during which the power supply to said heating element is cut off can be selectively pre-determined for each one of said plurality of washing programmes.
3. Washing machine according to claim 2, characterized in that the duration of said pre-definable periods of time can be adjusted either in a continuous manner or at fixed increments corresponding to discrete values through an externally provided control means.
4. Washing machine according to any of the preceding claims, characterized in that the number of said periods of time during which said heating element is de-energized depends on the particular washing programme selected.
5. Washing machine according to any of the preceding claims and provided with a 90°C washing programme, characterized in that during said washing programme there are provided three phases during which the heating element is de-energized upon reaching three respective pre-determined temperature values.
6. Washing machine according to any of the preceding claims and provided with a 60°C washing programme, characterized in that during said washing programme there are provided two phases during which the heating element is de-energized upon reaching two respective pre-determined temperature values.
7. Washing machine according to any of the preceding claims and provided with a 40°C washing programme, characterized in that during said washing programme there is provided one phase during which the heating element is de-energized upon reaching a respective pre-determined temperature value.
8. Washing machine according to any of the preceding claims, characterized in that during such at least one period of time during which the heating element is de-energized, the drum is driven so as to rotate in a different manner as compared to the manner in which it rotates during the remaining portion of the washing phase.

152/203



(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 722 008 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
26.03.1997 Bulletin 1997/13

(51) Int. Cl.⁶: D06F 35/00, A47L 15/46

(43) Date of publication A2:
17.07.1996 Bulletin 1996/29

(21) Application number: 95120402.3

(22) Date of filing: 22.12.1995

(84) Designated Contracting States:
DE ES FR GB IT

(30) Priority: 05.01.1995 IT PN950002

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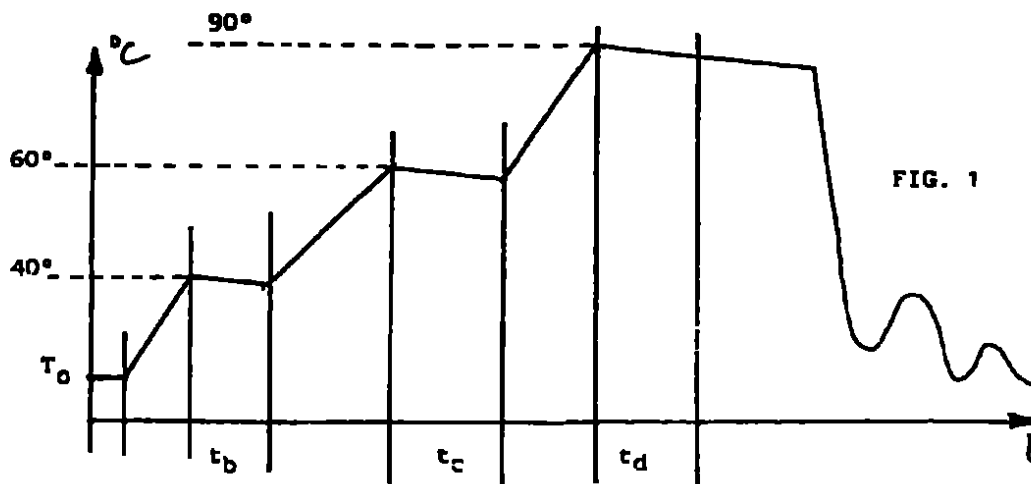
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(54) Improvement in the washing programmes of clothes washing or dishwashing machines

(57) Clothes washing or dishwashing machine provided with a washing vessel, a heating element for heating up the liquor in said vessel, a sensor means for detecting the temperature of said liquor, a control and actuating apparatus connected to the various functional parts and sensors of the machine, said apparatus being adapted to trigger and control a plurality of washing programmes which differ from each other at least for the fact that each programme defines the attainment of a highest temperature value of the liquor in the vessel which is anyhow different from the highest temperature

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European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 95 12 0402

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.4)
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A	* the whole document *	2-7	
X	EP-A-0 346 212 (CIAPEM)	1,8	
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X	DE-A-18 12 653 (SIEMENS-ELECTROGERÄTE GMBH)	1	
A	* the whole document *	2-8	
A,D	EP-A-0 596 302 (ZANUSSI ELETTRODOMESTICI S.P.A.)		
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			D06F A47L
Place of search THE HAGUE		Date of completion of the search 29 January 1997	Examiner Courrier, G
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : oral-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document			

EPO FORM 1501 (1/95) (PAGES)

②

DEMANDE DE BREVET EUROPEEN

② Numéro de dépôt: 88401559.3

② Int. Cl.⁴: D 06 F 35/00

Date de dépôt: 06.06.89

Priorité: 10.06.88 FR 8807762

② Date de publication de la demande:
13.12.89 Bulletin 89/50

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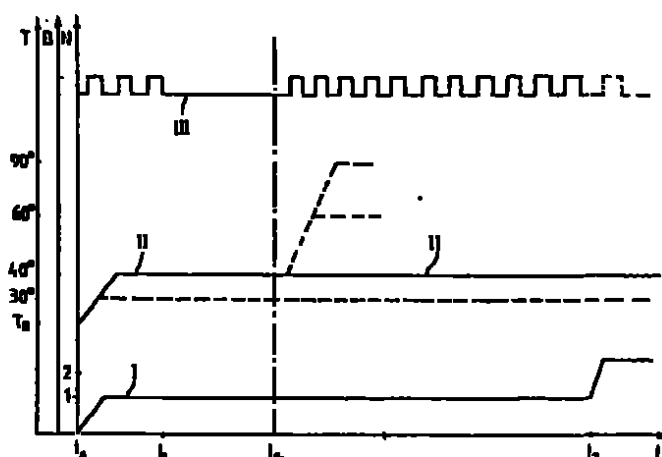
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② Lave-linge pourvu d'une phase de trempage.

② Lave-linge pourvu dans ses cycles de fonctionnement, d'une phase de trempage, caractérisé en ce qu'il comprend dans son fonctionnement une phase de trempage du linge (t_0-t_1) à durée réglable, suivie sans interruption dans le temps, par une phase de lavage du linge (t_2-t_1).



EP 0 346 212 A1

Bundesdruckerei Berlin

Description

LAVE-LINGE POURVU D'UNE PHASE DE TREMPAGE

La présente invention concerne lave-linge pourvu d'une phase de trempage.

Dans un lave-linge pour augmenter des performances de lavage, deux solutions connues ont été proposées, l'une consiste à augmenter dans une phase de lavage d'un cycle de fonctionnement, la température du liquide de lavage et l'autre à ajouter à une phase normale de lavage, une phase de prélavage à durée fixe où s'effectue un lavage court avec un brassage normal du linge dans un liquide muni de lessive et à une température de l'ordre de 30°C à 40°C, et une vidange du liquide en fin de cette phase de prélavage. On constate qu'une augmentation de la température du liquide de lavage favorise une action physico-chimique des produits lessiviels sur des salessures et rend plus efficace le lavage mais se révèle au delà d'un certain niveau, incompatible avec un certain nombre de textiles qui ne supportent pas une température trop forte.

Une adjonction d'une phase de prélavage à une phase normale de lavage dans un lave-linge donne un bon résultat de lavage. Cependant cette addition augmente fortement une consommation en eau, en énergie de chauffage et en lessive. La quantité de lessive utilisée pour les deux phases de prélavage et lavage peut alors dépasser 1,5 fois une dose habituelle de lessive pour une phase normale de lavage.

La présente invention ayant pour but d'éviter ces inconvénients, permet de réaliser un lave-linge performant et économique en lavage, aussi bien pour un linge fragile sensible à la température, que pour un linge résistant à celle-ci.

Selon l'invention, un lave-linge pourvu dans ses cycles de fonctionnement, d'une phase de trempage, caractérisé en ce qu'il comprend dans son fonctionnement une phase de trempage du linge à durée réglable, suivie sans interruption dans le temps, par une phase de lavage du linge.

Pour mieux faire comprendre l'invention on en décrit ci-après un certain nombre d'exemples de réalisation, illustrés dans un dessin ci-annexé qui représente des courbes de fonctionnement d'un lave-linge mettant en oeuvre l'invention.

Un lave-linge qui met en oeuvre l'invention comprend une cuve, un tambour à linge, un moteur d'entraînement, des éléments de chauffage du liquide de trempage de lavage ou de rinçage, des dispositifs d'alimentation en eau et en produits lessiviels et des systèmes de mesure de niveaux d'eau, et des organes de commande, qui sont ceux de types connus, et ne sont pas représentés et décrits en détail dans la suite.

Selon l'invention, le lave-linge comprend dans ses cycles de fonctionnement, une phase de trempage à durée réglable, suivie sans interruption dans le temps par une phase de lavage, autrement dit, la phase de trempage n'étant pas séparée de la phase de lavage par un arrêt à durée indéterminée du lave-linge. Les organes de commande du lave-linge font passer automatiquement et directement la

phase de trempage à la phase de lavage. Durant la phase de trempage et la phase de lavage, la température du liquide de trempage et du liquide de lavage est maintenue à une valeur relativement modique entre 30°C et 45°C.

Dans l'exemple illustré, cette température est de 40°C et représentée en trait plein par une courbe II, la température ambiante étant T_a .

Une dose d'un produit lessiviel prédéterminée pour un cycle de fonctionnement de ce lave-linge est introduite dans le liquide de trempage durant la phase de trempage. Aucune vidange de liquide n'est effectuée entre la phase de trempage et la phase de lavage, et durant ces deux phases. Le liquide introduit dans le lave-linge dans la phase de trempage constitue ainsi un liquide commun de trempage et de lavage du linge. La phase de trempage comprend un brassage court et suffisant du linge, effectué dans un début de cette phase, pour parfaire un mouillage total de ce linge avec le liquide de trempage pourvu de produit lessiviel, et un repos pour la restant de cette phase où le linge à l'état immobile est trempé dans ce liquide. Dans la phase de lavage qui suit la phase de trempage, le linge est soumis à un brassage continu à des cadences habituelles, du début à la fin de cette phase. Le brassage du linge est représenté par des ondulations, dans une courbe III du dessin ci-annexé. Ainsi dans la phase de trempage t_0 à t_2 , le brassage du linge occupe une partie du temps t_0 à t_1 et un repos imposé à ce linge s'étend entre t_1 et t_2 , et dans la phase de lavage t_2 à t , le brassage du linge occupe tout le long de cette phase t_2 à t .

Selon une autre caractéristique, dans la phase de trempage t_0 à t_2 et une première partie t_2 à t_3 de la phase de lavage t_2 à t , un liquide commun de trempage et de lavage est admis dans le lave-linge jusqu'à un niveau intermédiaire N_1 (courbe I) et dans la deuxième partie t_3 à t de la phase de lavage t_2 à t , le liquide commun de trempage, de lavage est élevé jusqu'à un niveau maximal prédéterminé N_2 .

Ce mode de remplissage du lave-linge permet d'avoir un liquide de trempage et un liquide de lavage dans un début de la phase de lavage, fort en concentration en produit lessiviel qui exerce une puissante action sur des salessures et d'obtenir un excellent résultat de lavage sans que la température de ce liquide de trempage et de lavage soit portée à une valeur supérieure à 45°C.

Dans un tel lave-linge où la température de travail est inférieure ou égale à 45°C environ, un linge fragile sensible à la température et un linge solide résistant à celle-ci peuvent être indifféremment lavés, sans risque de dommage causé à ce linge.

Des essais comparatifs de lavage d'un linge coton effectué avec un même produit lessiviel révèlent d'une façon inattendue qu'un résultat analogue de lavage est obtenu successivement dans un lave-linge mettant en oeuvre l'invention où la température du liquide de trempage et de lavage est à une valeur de 40°C environ, et dans un lave-linge connu où une

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phase de prélavage classique (rappelée dans des paragraphes précédents) est ajoutée à une phase de lavage, et dans la phase de lavage, la température du liquide de lavage est portée à une valeur de 60°C, et qu'en plus une consommation en lessive, en eau et en énergie de chauffage dans le lave-linge mettant en oeuvre l'invention est nettement inférieure à celle dans le lave-linge connu.

Cet excellent résultat est probablement dû aux facteurs efficaces révélés par l'invention à savoir une bonne concentration en produit lessiviel durant le trempage et une première partie de la phase de lavage obtenue par une dissolution de ce produit dans une quantité intermédiaire de liquide N₁ dans le lave-linge, une température modérée du liquide de trempage et de lavage, un mouvement réduit du linge durant le trempage.

Dans une variante (non représentée) de mise en oeuvre de l'invention, des durées de brassage du linge respectivement séparées par de plus longues périodes de repos du linge sont effectuées le long de la phase de trempage pour favoriser une bonne pénétration du liquide de trempage dans le linge et une uniformité de contact entre le liquide de trempage et la totalité de la surface de ce linge.

Selon une autre variante de mise en oeuvre de l'invention, pour un lavage de linge résistant à la température, la température du liquide de trempage et du liquide de lavage est portée durant la phase de trempage (t₀-t₂) à une valeur entre 30°C et 45°C, et durant la phase de lavage (t₂-t) à une valeur entre 45°C et 90°C, l'action physico-chimique résiduelle du produit lessiviel utilisé dans le lave-linge, pouvant ainsi être pleinement développée. Un excellent résultat de lavage est alors obtenue.

trempage (t₀-t₂) et une première partie de la phase de lavage (t₂-t₃), le liquide commun de trempage et de lavage est admis dans le lave-linge jusqu'à un niveau intermédiaire N₁, et dans une deuxième partie de cette phase de lavage (t₃-t), le liquide est élevé jusqu'à un niveau maximal prédéterminé N₂.

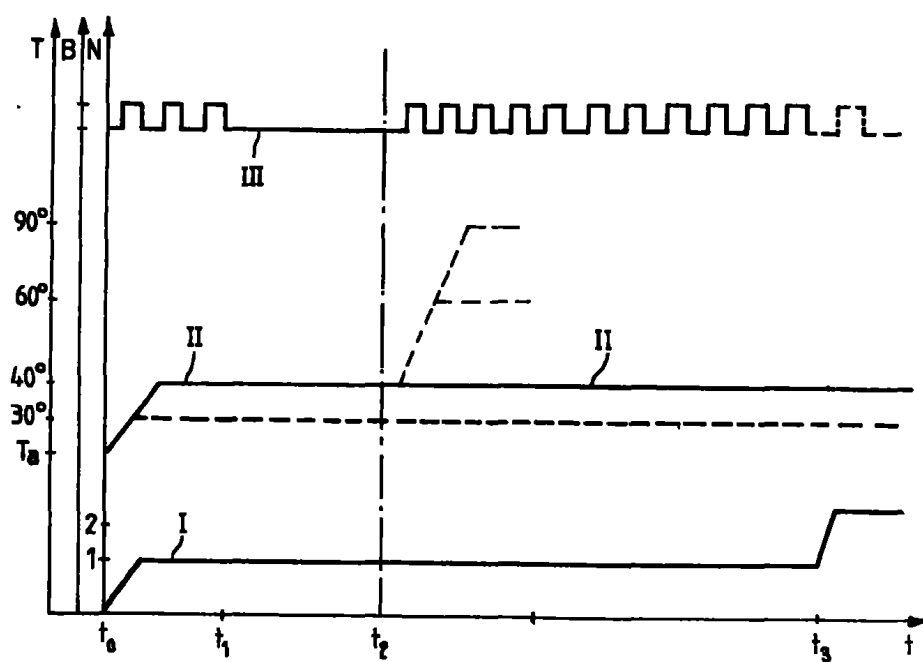
Revendications

1. Lave-linge pourvu dans ses cycles de fonctionnement, d'une phase de trempage suivie sans interruption dans le temps, par une phase de lavage du linge, caractérisé en ce qu'il comprend dans son fonctionnement un liquide commun pour le trempage et le lavage, une absence de vidange de ce liquide entre les phases de trempage et de lavage et durant celles-ci et un maintien de la température du liquide de trempage et du liquide de lavage à une valeur au moins égale à 30°C.

2. Lave-linge selon la revendication 1, caractérisé en ce que durant la phase de trempage (t₀-t₂) la température du liquide de trempage et du liquide de lavage est portée à une valeur située entre 30°C et 45°C, et durant la phase de lavage (t₂-t), la température de ce liquide de lavage est élevée à une valeur comprise entre 45°C et 90°C.

3. Lave-linge selon l'une des revendications 1 et 2, caractérisé en ce que dans la phase de trempage, le linge est soumis à des durées de brassage respectivement séparées par des durées de repos plus longues.

4. Lave-linge selon l'une des revendications 1 à 3, caractérisé en ce que dans la phase de



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RAPPORT DE RECHERCHE EUROPEENNE

Numéro de la demande

EP 89 40 1559

DOCUMENTS CONSIDERES COMME PERTINENTS			
Catégorie	Citation du document avec indication, en cas de besoin, des parties pertinentes	Revendication concernée	CLASSEMENT DE LA DEMANDE (Int. C.I.F.)
A	FR-A-1327466 (ROBERT BOSCH G.M.B.H.) * page 2, ligne 76 - page 3, ligne 40; revendications -; figures 1, 2 *	1-4	D06F35/D0
			DOMAINES TECHNIQUES RECHERCHES (Int. C.I.F.)
			D06F
Le présent rapport a été établi pour toutes les revendications			
Lieu de la recherche LA HAYE		Date d'achèvement de la recherche 18 SEPTEMBRE 1989	Examineur COURTIER G.L.A.
CATEGORIE DES DOCUMENTS CITES		L : thème ou principe à la base de l'invention E : document de brevet antérieur, mais publié à la date de dépôt ou après cette date D : cité dans la demande F : cité pour d'autres raisons A : membre de la même famille, document correspondant	
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EPN FORM 150 (3.1.1988)



Europäisches Patentamt
European Patent Office
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(11) Publication number:

0 038 671
A3

408
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(12)

EUROPEAN PATENT APPLICATION

(17) Application number: 81381882.9

(18) Int. Cl.: D 06 F 35/00
D 06 F 33/02

(19) Date of filing: 15.04.81

(20) Priority: 15.04.80 GB 8012555

(21) Date of publication of application:
28.10.81 Bulletin 81/43

(22) Date of deferred publication of search report: 18.02.82

(23) Designated Contracting States:
AT BE CH DE FR IT LI LU NL SE

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(27) Improvements relating to methods of and machines for washing textile articles.

A method of washing textile articles in which, whilst the articles are immersed in a washing liquid, the liquid may be heated to a low temperature in the region of 30°C and is agitated for brief periods in the region of 15 to 60 seconds by reversal of a drum (2) rotatable about a substantially horizontal axis and containing the liquid and articles in each of a succession of longer basic periods in the region of 5 to 20 minutes, all continuing over a period of 2 hours or longer. Preferably increments of rotation are of different amounts in opposite directions respectively. A machine having a control means (10, 23, 44) determining the temperature (44) of the liquid and the durations of the basic periods and periods of agitation is also provided. The method of washing provides considerable saving in energy whilst achieving satisfactory cleanliness of the articles washed.

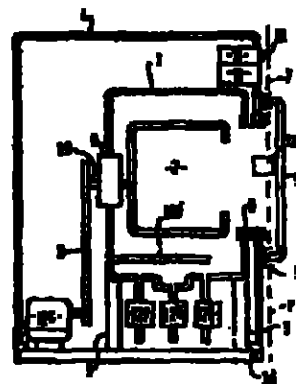
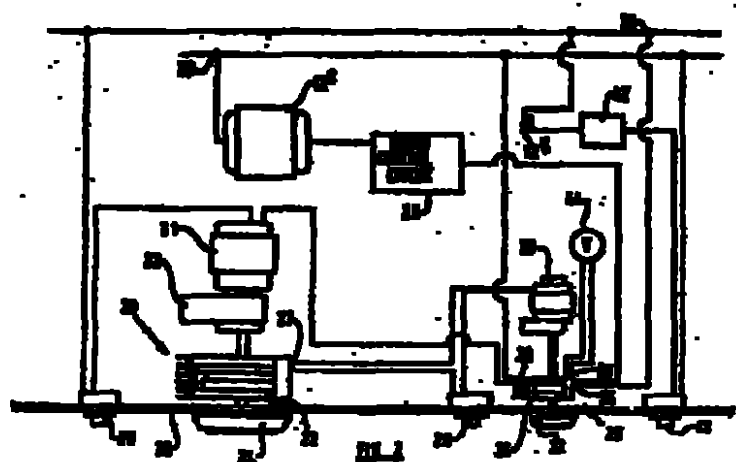


Fig. 1

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EUROPEAN SEARCH REPORT

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Application number

EP 81 30 1659

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Art. 61)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>GB - A - 1 224 403 (HOLZER)</u> * Page 2, lines 49-97 *	1-10	D 06 F 35/00 33/02

	<u>FR - A - 2 028 680 (EUROPE MANUFACTURING TRUST)</u> * Page 1, lines 1-16; page 2, lines 13-16, 25-27 *	1-10	

	<u>DE - A - 1 610 132 (SIEMENS)</u> * Page 2, line 17 - end; page 3, lines 1-22; page 5, lines 3-23 *	1,3,7,8,10	TECHNICAL FIELD SEARCHED (Art. 61)
	---		D 06 F
	<u>FR - A - 1 525 295 (SEDELEM)</u> * Page 1, left-hand column, lines 22-29 *	1,2	

	<u>GB - A - 1 174 815 (CANDY)</u> * Whole document *	1,4	

	<u>DE - A - 1 585 648 (CANDY)</u> * Page 2, lines 18-24; claim 1 *	1,7,10	CATEGORY OF CITED DOCUMENTS
	---		X: particularly relevant A: technological background C: non-written disclosure F: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
	<u>DE - A - 1 410 174 (CONSTRUCTA)</u> * Claim 1 *	1,7,10	

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The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search		Date of completion of the search	Examiner
The Hague		06-11-1981	D'HULSTER



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Application number
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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (pat. CL)
Category	Content of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>GB - A - 970 516 (CONSTRUCTA)</u> * Page 2, lines 107-123 * ---	1	
A	<u>US - A - 3 467 489 (ZANUSSI)</u> * Claims * -----	1	
			TECHNICAL FIELD SEARCHED (pat. CL)

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EUROPEAN PATENT APPLICATION

⑲ Application number: 81301659.9

⑳ Int. Cl.²: D 06 F 35/00
D 06 F 33/02

㉑ Date of filing: 15.04.81

㉒ Priority: 16.04.80 GB 8012555

㉓ Date of publication of application:
29.10.81 Bulletin 81/43

㉔ Designated Contracting States:
AT BE CH DE FR IT LI LU NL SE

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㉘ Improvements relating to methods of and machines for washing textile articles.

㉙ A method of washing textile articles in which, whilst the articles are immersed in a washing liquid, the liquid may be heated to a low temperature in the region of 30°C and is agitated for brief periods in the region of 15 to 60 seconds by reversal of a drum (2) rotatable about a substantially horizontal axis and containing the liquid and articles in each of a succession of longer basic periods in the region of 5 to 20 minutes, all continuing over a period of 2 hours or longer. Preferably increments of rotation are of different amounts in opposite directions respectively. A machine having a control means (10, 28, 44) determining the temperature (44) of the liquid and the durations of the basic periods and periods of agitation is also provided. The method of washing provides considerable saving in energy whilst achieving satisfactory cleanliness of the articles washed.

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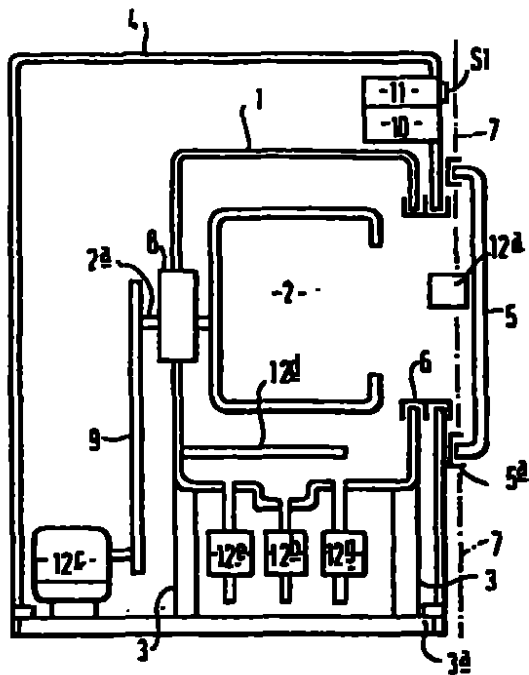


FIG. 1

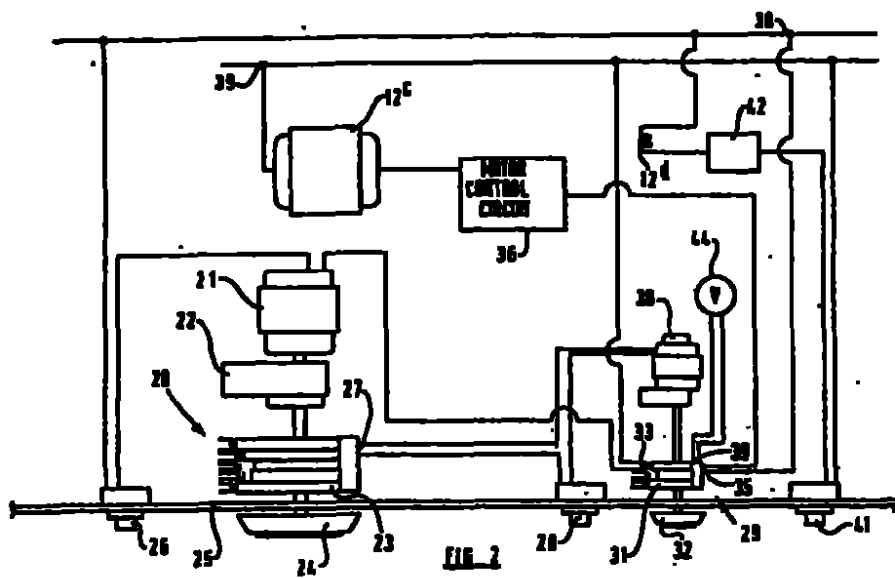


FIG. 2

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Title: Improvements relating to methods of and machines for washing textile articles.

This invention relates to a method of and machine for washing clothes or other textile articles.

Conventional washing machines comprise a body including a chamber containing a perforated drum mounted for rotation about a horizontal axis and having an opening at one end through which the articles can be loaded into the drum, the latter being driven by an electric motor usually in a cycle which involves rotation in one rotational sense and then rotation in the other rotational sense at a speed in which the articles undergo tumbling action in a washing liquid introduced into the chamber to a level such that the articles in the drum are immersed in the liquid. Such washing action is continued for a relatively prolonged period and thereafter the washing liquid (which may contain a detergent) is pumped out of the machine and the articles are subjected to at least one rinsing in fresh water fed into the washing chamber after which it is pumped out, the articles being then subjected to centrifugal extraction by spinning the drum. Usually the rinsing and centrifugal extraction operations are repeated twice more.

Whilst efficient washing of the articles can be achieved by this conventional method, it does consume a considerable amount of energy both by reason of the fact that the washing action is continued for an appreciable period, and in this action the load of articles is raised from the lowest point of the drum to near its highest point repeatedly, and by reason of the fact that the drum undergoes reversals of rotation so that it has to be repeatedly accelerated from rest to the "tumbling" speed.

The ability of automatic washing machines to clean articles of clothing and other textile articles is considerable. However the energy expended by such machines can make a washing process quite expensive. It would be desirable therefore to provide in an automatic washing machine programme some washing event that enables the same cleanliness to result in the articles at the end of a washing programme with a reduced expenditure of energy.

It is known to soak articles to be washed for a long period, for example overnight, in cold water in washing liquid. However the dirt from the articles tends to form a scum on the surface of the washing liquid and then when the washing liquid is subsequently pumped out of the machine before the articles are removed therefrom, the scum settles on the surface of the articles and causes streaks or tide marks, which in a subsequent washing operation are as difficult, if not more so, to remove from the articles than the original dirt.

The above described soaking technique has therefore not really provided a satisfactory answer to providing a more economical method of washing textile articles and no longer finds the popularity with which it was first received.

Because of the rather unsatisfactory result of soaking articles as afore described, the tendency has been to provide shorter washing programmes which, since they are carried out for a briefer length of time, use considerably less energy and for some articles are quite satisfactory. However other articles made from different material, for example, or articles which by their nature of use are more soiled, may not reach a sufficient degree of cleanliness and require further washing.

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5 The object of the present invention is to provide a method of washing by means of which energy saving can be achieved without detriment to washing performance, that has the ability to extract dirt from the articles undergoing washing and thereafter remove it from the vicinity of the articles.

10 According to the present invention a method of washing textile articles comprises substantially immersing the articles in a washing liquid, subjecting the washing liquid to agitation and subsequently removing the articles from the washing liquid relatively from the immersed relation, characterised in that:

- 15 a. the washing liquid is not higher than a predetermined relatively low temperature;
- b. the washing liquid is subjected to agitation for a relatively brief period in each of a succession of considerably longer basic periods.

20 The term "washing liquid" includes water, water to which a detergent has been added, and water to which a biological agent has been added.

The number of considerably longer basic periods will be such that a sufficient time is allowed to remove dirt from the articles into the washing liquid.

25 The method preferably includes heating the washing liquid to a relatively low temperature. By "relatively low" is meant a temperature above that at which unheated water available from normal domestic water systems is supplied and which generally is between 4°C and 15°C depending upon climatic conditions, but not higher than
30 is no more than pleasantly warm to the hand. Typically a "relatively low" temperature would be 30°C but it is contemplated that more generally it would be in the range of 20°C to 40°C.

It has surprisingly been found that even though the known technique of soaking articles for long periods in washing liquid did not produce satisfactory results, by causing, albeit intermittent, agitation of the washing liquid, the scum previously formed on the surface of the washing liquid was dispersed into suspension in the water which prevented the forming of streaks and tide marks on the articles being washed once the water was removed.

Furthermore, the intermittent agitation of the washing liquid, by causing movement of the articles being washed, considerably increased the effectiveness of the washing liquid to remove dirt therefrom. It is believed that this is primarily because of the relative motion between the washing liquid and the articles being washed.

By heating the washing liquid to a predetermined relatively low temperature, i.e. a temperature considerably lower than the temperature at which washing liquid is normally heated in automatic washing machines, an even more beneficial result was attained.

It was found that by heating to a relatively low temperature such as 30°C, i.e. less than normal body heat temperature, the length of time for which the soaking with intermittent action took place to achieve the same result could be considerably shortened.

The benefits obtained from heating to low temperature can be achieved at very little expenditure of energy since a typical low temperature of about 30°C may not require any additional heating by the machine which is supplied from a domestic hot water supply, or if the supply is from a cold supply, the amount of energy required to heat to 30°C would not be excessive and, in order to maintain the temperature of the washing liquid at the predetermined low temperature will require only a

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5 small amount of energy since the temperature differential between the washing liquid at this relatively low temperature and the surrounding temperature, is far less than the temperature differential between washing liquid at normal operating temperatures in conventional washing machines and the surrounding temperature. Thus the heat "loss" is considerably reduced compared with that experienced in a conventional washing cycle.

10 Provided, however, the agitation of the liquid is repeated at the intervals of time aforesaid, the dirt remains distributed throughout the body of washing liquid rather than forming a scum on the surface and the streaking or "tide mark" effect is eliminated.

15 There is considerable flexibility of choice as to the ratio of the periods of time over which the agitation of the washing liquid is effected and the basic periods of time. Satisfactory results have been achieved using a ratio of 1 to 20 made up of an agitation period of 30 seconds in a basic period of 10 minutes.

20 It is contemplated, however, that these periods of time may be varied without deleterious effect based on the following considerations. Lengthening of the periods of agitation results in higher consumption of energy and it is, therefore, undesirable to lengthen these periods
25 unduly if satisfactory loosening and removal of the dirt has already been achieved by the use of shorter periods of agitation. Evidently too big a reduction in the period of agitation will react adversely on washing performance, that is ability to loosen and remove the
30 dirt. It is believed that the ratio above referred to may be increased to $1/5$ or reduced to $1/80$ without encountering the specific disadvantages referred to to any significant extent.

As regards the magnitude of each agitation period, it is considered on the basis of similar considerations that it might be reduced to 15 seconds or increased to 60 seconds and correspondingly the basic period might be
5 reduced to 5 minutes or increased to 20 minutes.

Further, when agitation is effected by rotation at a tumbling speed of a drum rotatable about a horizontal axis and in which both the articles and liquid are present, it is preferred to effect such agitation by
10 increments of rotation of different amounts in opposite directions respectively, e.g. 4 seconds in a forward direction and 2 seconds in a reverse direction.

It is not intended that this range of ratios or the ranges of the agitation period and the basic period
15 should be strictly limiting since evidently the degree of contamination of the articles by dirt and the nature of the articles themselves would admit of variations outside these limits being effected without detriment to washing performance or consumption of energy, or indeed with
20 benefit thereto.

In principle, however, the washing method differs fundamentally from that which is customarily in use, in that it is composed of brief periods of agitation in substantially longer basic intervals repeated over a substantially longer period of time. Thus it is contemplated that the overall period of time may be in the
25 region of 2 hours and preferably will be longer.

The steps of the method in accordance with the invention as above defined may be supplemented by the
30 conventional step of supplying water to the articles for rinsing and thereafter subjecting the articles to centrifugal extraction either once or a plurality of times as is conventionally performed.

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Further, if desired, the steps of the method above defined may be preceded by subjecting the liquid to agitation for a longer time (possibly the whole of the basic period) during the first basic period and thereafter reverting to agitation for said brief period within each subsequent basic period.

From a further aspect the invention resides in the provision of a machine for washing textile articles comprising a body defining a washing chamber for reception of the articles to be washed, means for supplying washing liquid to said chamber, means for agitating said liquid in said chamber, means for discharging the washing liquid from said chamber, characterised in that control means are provided for rendering the agitation means operative for a brief period in each of a succession of considerably longer basic periods.

Preferably the machine will also include means for heating the washing liquid, and means for controlling the temperature to which it is heated to a relatively low value as herein defined.

The ratio of the brief periods of agitation to the basic periods, and the values of each of these periods may be as already referred to in defining the method of the invention.

The invention will now be described with reference to the accompanying drawings wherein:-

FIGURE 1 is a diagrammatic view in side elevation and in vertical cross-section of one embodiment of washing machine in accordance with the invention for performing the method thereof;

FIGURE 2 illustrates part of a washing machine control circuit for effecting the method of washing in accordance with the present invention;

FIGURE 3 is a schematic circuit diagram of the control circuit of such washing machine;

5 Referring firstly to Figure 1, the washing machine illustrated comprises a body which includes a stationary washing chamber 1 which may be of generally cylindrical form containing a washing drum 2 rotatable about a horizontal axis, the washing chamber being supported in any suitable manner, for example by struts 3 from a base 3a.

10 A casing 4 encloses the washing chamber and drive means for the drum which comprises a motor 12c which drives the drum spindle 2a through the intermediary of a belt and pulley drive 9. The spindle 2a and the drum is supported by a suitable bearing 8 carried by the washing chamber.

15 The washing chamber has a plurality of inlets, for example hot water inlet controlled by a solenoid valve 12e, a cold water inlet controlled by a solenoid valve 12g and a drain outlet preferably communicating with a well or sump in the washing chamber and controlled by an
20 electrically driven pump 12b.

The washing chamber 1 is sealed with respect to the casing by a flexible gasket or sealing ring 6 and the entrance to the washing chamber 1 and drum 2 is controlled by a door 5 which is hingedly connected to the
25 casing 4 about a vertical axis 7 and is movable upon release of a solenoid controlled door lock 12a between the closed position shown and an open position. Associated with the door is a sealing ring or gasket 5 operative between the door and the casing.

30 A further functional unit seen in Figure 1 is a heater 12d for heating the liquid in the washing chamber. Other electrically energised functional units are

omitted from Figure 1 merely for the sake of simplicity and may include a solenoid operated conditioner valve controlling the flow of conditioning liquid through a duct into the washing chamber.

5 Referring now to Figure 2, a simple control mechanism for bringing the invention into effect is illustrated.

10 A conventional programme control mechanism shown by arrow 20 has an electric motor 21 which drives through gearbox 22 a rotary cam-operated switch 23. The position from which the rotary switch 23 commences is adjustable by a manually controlled member 24 which is normally situated externally of the casing 25 of the washing machine normally on the front panel thereof. The operation of such switches is well known and in use, depending on the wash programme required, the control member 24 is rotated from an off position to a commence position, a start switch 26 is operated, the motor 21 will rotate causing rotation of rotary switch 23.

20 The rotary switch 23 comprises many different pairs of contacts which are operated sequentially to cause the normal functions of a washing machine to operate, such as valves to allow the ingress or prevent ingress of water into the washing machine, a pump to pump out the water from the washing machine and heating means to heat the water to the required temperature etc.

25 The rotary switch 23 is provided with a pair of contacts 27 connected through switch 28 to a second programmer generally indicated at 29 and which comprises motor/gearbox 30, rotary timer switch 31 and manually operable member 32.

If it is required in a washing programme to employ the method of washing of the present invention, the switch 28 is closed and at a predetermined time in a washing programme, preferably near the beginning (see programmes on page 16), the rotary switch 23 closes contacts 27 which has the effect, providing the switch 28 has been closed, of commencing operation of motor 30 which drives rotary timer switch 31.

The rotary timer switch 31 has a plurality of contacts, one pair of which 33 are normally closed but, on energisation of motor 30 they will open to prevent further rotation of the conventional programmer 20.

A second pair of contacts 34 will open, which contacts 34 are connected to the water inlet valve to allow the container to fill with water and contacts 35 will also close. The contacts 35 connect the motor 12c driving the drum 2 through an electrical control circuit 36 to a source of supply connected to terminals 38 and 39.

The electronic circuit 36 is adapted to provide energy for a short duration at predetermined intervals of time such that the motor 12c will be energised for a period of 30 seconds for example once in each basic period of 10 minutes for example. Such electronic circuits are well known and may comprise semi-conductor switches operated by constant time delay means provided by the rate of charging of a capacitor through resistive means.

The electronic circuit 36 may also be adapted during its period of energisation to cause the motor 12c to rotate the drum 2, first in one direction and then in an opposite direction of rotation. Such action can be achieved by using a D.C. electric motor to drive the drum

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2 and causing a reversal of polarity of energisation by the control circuit 36 to cause reversed rotation.

5 The clothing or other textile articles present in the drum 2 will thus be washed in accordance with the method of the present invention for a period of time which may be determined by the manually operable member 32.

10 The rotary timer switch 31 may, for example, be adapted to complete one revolution in 12 hours but its starting point may be predetermined by rotating the manually operable member 32 to any desired position so that the method of washing of the present invention may be carried out for any time, say from a quarter of an hour to 12 hours.

15 On completion of rotation of the timer, the contacts 33 will again close which will once again connect power to the motor 21, thus recommencing operation of the programmer 20 to allow the remainder of the washing programme to continue.

20 During the method of washing of the present invention controlled by programmer 29, the water will not be heated in the washing machine itself. In the case where a hot water supply and a cold water supply both supplies may have been open to fill the tub with water, that is at
25 a relatively low temperature, for example 30°C, or alternatively only the valve allowing cold water to enter may have been opened, in which case the temperature of the water will be lower.

30 In the case of an automatic machine having a cold fill only, when time is limited and it is desired to achieve the same results in a short time by using the method of washing of the present invention as would be

achieved by carrying out the method of washing of the present invention for a considerably longer time in cold water, the water may be heated to said predetermined low temperature by heater 12d.

5 A switch 41 is provided on the facia of the washing machine which, when in its switched on position will ensure that the heater 12d is energised through thermostat 42 designed to switch on and off at the predetermined desired low temperature so that the water will be
10 heated by heater 12d up to the desired low temperature and when it achieves that temperature thermostat 42 will open to terminate the heating supply. If the temperature falls below the predetermined low temperature thermostat 42 will once again switch on to re-energise the heater
15 12d to return the water to said predetermined low temperature.

 Figure 2 shows only one pair of contacts 34 connected to water valve 44 for allowing the ingress of water into the tub. However it will be appreciated that
20 in a washing machine which is adapted to be supplied with both hot and cold water from a supply, there may be two such pairs of contacts 34 and two water valves 44, one for the hot water and one for the cold water.

 The point of time at which the method of washing of
25 the present invention is carried out during a conventional washing cycle will preferably be near the beginning of that cycle. However the remainder of the washing cycle will, in view of the substantial degree of cleaning carried out by the method of washing of the present
30 invention, be considerably shorter than would normally have been the case. Thus, if the method of washing of the present invention is selected by switching on switch 28, it will also have the effect of curtailing some of the stages, in particular the washing stage of the subsequent part of the programme.
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The above described arrangement is only one method of providing control means for permitting of operation of the method of washing of the present invention and an alternative method of control can incorporate a micro-processor in which the switching of the various functional items of the machine is carried out electronically. Such a method of operation will now be described with reference to Figure 3.

Referring now to Figure 3, the electrically energised functional units are identified at 12a to 12g. The supply of current to these units from a 240 volt alternating current mains is connected to the input terminals t1, t2 of a main manually operable isolator switch S1, the output terminals t3, t4 of which are connected to the primary winding of power supply transformer T1 and also to power supply rails 15 and 16, in the latter case through the intermediary of a switch S2 operated by door release solenoid 12a.

The supply of current to the functional units 12a to 12g from the conductors 15 and 16 is controlled by respective gate controlled semi-conductor devices 13a to 13g respectively in accordance with the output signals developed at the outlets of control circuits incorporating a micro processor and designated 10a to 10g respectively. In the case of functional units 13b to 13g these outputs are fed through the intermediary of an output driver 17. Associated with the functional devices are a number of supplementary devices which control or contribute to the function performed by the functional devices, these being high, medium and low level switches S3, S4, S5 serving respectively to control current to the hot water solenoid valve 12e, cold water solenoid valve 12f and heater 12d and which provide inputs to the micro processor at terminals 10k, 10l, 10m. to control the liquid levels in the drum. A further supplementary

device is a tacho generator 12c₁, operatively coupled mechanically as indicated by the broken line 12c₂ to drive motor 12c and providing an input to the micro processor at terminal 10n.

- 5 A further supplementary device is a thermistor Th₁ which senses the temperature of the washing liquid in the washing chamber and provides an input to the micro processor at terminal 10p.

- 10 The direction of energisation of the field winding F of the drive motor 12c is controlled by a further supplementary device, namely a relay RV having reversing contacts S6 and powered from secondary winding T1c, transformer T1 (44 volts). The relay RV is operated under the control of the output at micro processor terminal 10i.
15 The magnitude of the current in the motor is controlled by the output at terminal 10q of the micro processor and current supply to the motor is isolated by a master relay MR having switch contacts S7.

- 20 For bringing the washing machine into operation in accordance with the required programme, a series of switches, preferably of the press button type, S8a to S8i provide inputs at terminals 11a to 11i respectively for initiating the following programmes or operations, namely cancel, open door, rinse hold, test, high level,
25 bio, prewash, start, and programme, the significance of which is explained hereinafter.

- 30 Indicator means 14 are provided comprising a plurality of electrically energisable indicator elements, for example light emitting diodes 14a - 14g which constitute a 7 segment numerical indicator and elements 14h - 14m which consist of single light emitting diodes, both sets of light emitting diodes being controlled by outputs at terminals 13a - 13g of the micro processor through the

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intermediary of a display power driver. The two sets of display elements, namely 14a - 14g and 14h - 14m are each supplied respectively by alternate half cycles of the A.C. electricity supply from transformer secondary T1b via diodes 19a and 19b.

The programming provided by the micro processor is such that certain of the display elements provide different classes of information at stages of operation of the machine. Thus before and during programme selection the single L.E.D.'s 14a - 14m indicate options for selection whilst the LED's providing the seven segment numerical indicator will indicate the identification number of the wash programme. After start the single L.E.D.'s 14a - 14m indicate progress of the selected wash programme as described later. If a fault develops, the seven segment numerical indicator display is then used to indicate this fact by flashing alternatively 'F' and a code number signifying the nature of the fault.

Referring now to the washing programmes which can be provided under the control of the micro processor, the latter may furnish outputs producing many different programmes, one of which will now be described in detail.

The method of washing of the present invention may be incorporated in a complete washing programme and is hereinafter referred to by the designation "Soak".

1. Fill cold for 10 seconds no action.

Fill hot and cold to high level with action.

Heat to 30°C with action.

Wash for 10 minutes.

SOAK - one tumble action every 10 minutes.

This sequence will continue until 'START' is pressed.

Pump spin at 95 r.p.m. for 1 minute 30 seconds.

2. Fill cold to low level no action.
Fill cold to high level with action.
Rinse for $1\frac{1}{2}$ minutes.
Pump spin at 95 r.p.m. for 1 minute 30 seconds.
5 Pump spin at 460 r.p.m. for 10 seconds.
Pump out with cold valve open for 15 seconds.
3. Fill cold to low level no action.
Fill cold to high level with action.
Rinse for $1\frac{1}{2}$ minutes.
10 Pump spin at 95 r.p.m. for 1 minute 30 seconds.
Pump spin at 460 r.p.m. for 10 seconds.
Pump out with cold valve open for 15 seconds.
4. Fill cold to low level no action.
Fill cold plus fabric conditioner to high level
15 with action.
Rinse for $1\frac{1}{2}$ minutes.
Pause until start is operated if rinse hold is
selected.
Pump spin at 95 r.p.m. for 1 minute 30 seconds.
20 Pump spin at 460 r.p.m. for 2 minutes.

It will be noted that although the initial wash
sequence set forth in sub-paragraph 1 does include a wash
action for 10 minutes, it is thereafter followed by a
sequence which involves a tumble action (producing agita-
25 tion of the liquid) every 10 minutes and typically this
agitation may be effected over a relatively brief period
of 30 seconds in each of a series of longer basic periods
of 10 minutes. This sequence continues until the start
control is pressed to bring into operation pump out of
30 the liquid followed by the rinse sequences set forth in
sub-paragraphs 2 to 4.

The sequence of paragraph 1 starting with the first
tumble action producing agitation of the washing liquid

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would be continued for at least 1 hour and preferably longer, for example 3 to 4 hours.

5 It would be possible to set a period automatically for continuance of the tumble sequence of the duration 1, 2 or more hours so that it is not necessary for the operator manually to press the start control and the machine would then continue with the sequences set forth in sub-paragraphs 2, 3 and 4 automatically.

10 The principal difference between the 'soak' technique of the present intention and conventional washes is that equivalent cleansing is achieved by long soak at relatively low temperature with minimum agitation compared with a short wash at high temperature with vigorous agitation. The economy is achieved by not
15 heating water to a high temperature, whilst the efficiency of the wash is maintained by the minimum wash action to prevent 'tide-marks' and redistribution of dirt.

20 This can be achieved by electronic control of the functional units of the machine without difficulties which would be encountered by use of a mechanical timer due to the long operational period which may be required e.g. starting the machine at say 2300 hours and terminating the soak programme at say 0800 hours the next day. The requisite programme to carry out the soak programme
25 hereinbefore referred to, followed, if required, by a main washing programme is provided by a microprocessor as more fully disclosed in our co-pending application entitled "Improvements relating to control circuits in or for washing and the like machines or other apparatus".

CLAIMS:

1. A method of washing textile articles comprising substantially immersing the articles in a washing liquid and subjecting the washing liquid to agitation and subsequently removing the articles from the washing liquid relatively from the immersed relation, characterised in that:
- 5
- a. the washing liquid is not higher than a pre-determined relatively low temperature;
- b. the washing liquid is subjected to agitation for
- 10 a relatively brief period in each of a succession of considerably longer basic periods.
2. A method as claimed in claim 1, characterised in that the washing liquid is heated to said predetermined relatively low temperature.
- 15 3. A method as claimed in either of claims 1 and 2; characterised in that the ratio of the time period over which agitation is effected to the basic period is between 1 : 5 and 1 : 80.
- 20 4. A method according to any one of the preceding claims, characterised in that the duration of each of the agitations is between 15 seconds and 60 seconds.
5. A method according to any one of the preceding claims, characterised in that the duration of each of the basic periods is between 5 minutes and 20 minutes.
- 25 6. A method according to any one of the preceding claims, characterised in that agitation is effected by rotation at a tumbling speed of the drum (2) rotatable about a horizontal axis and in which both the articles and liquid are present and in that the drum (2) is given
- 30 movements of rotation of different amounts in opposite directions respectively.

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7. A machine for washing textile articles adapted to carry out the method of washing textile articles as claimed in any one of claims 1 to 6.

5 8. A machine for washing textile articles comprising a body (1) defining a washing chamber for reception of the articles to be washed, means for supplying washing liquid to said chamber (1), means (2) for agitating said liquid in said chamber, means (12b) for discharging the washing liquid from said chamber (1), characterised in that
10 control means (10, 29) are provided for rendering the agitation means (2) operative for a brief period in each of a succession of considerably longer basic periods.

15 9. A machine according to claim 8 comprising means (40) for heating the washing liquid, characterised in that means (42) are provided for controlling the temperature to which it is heated to a relatively low value as herein defined.

20 10. A machine according either of claims 8 and 9, characterised in that control means (10, 29) are operable to control the ratio of the brief periods of agitation to the basic periods and the values of each of these periods as claimed in respect of any one of claims 3, 4 or 5.

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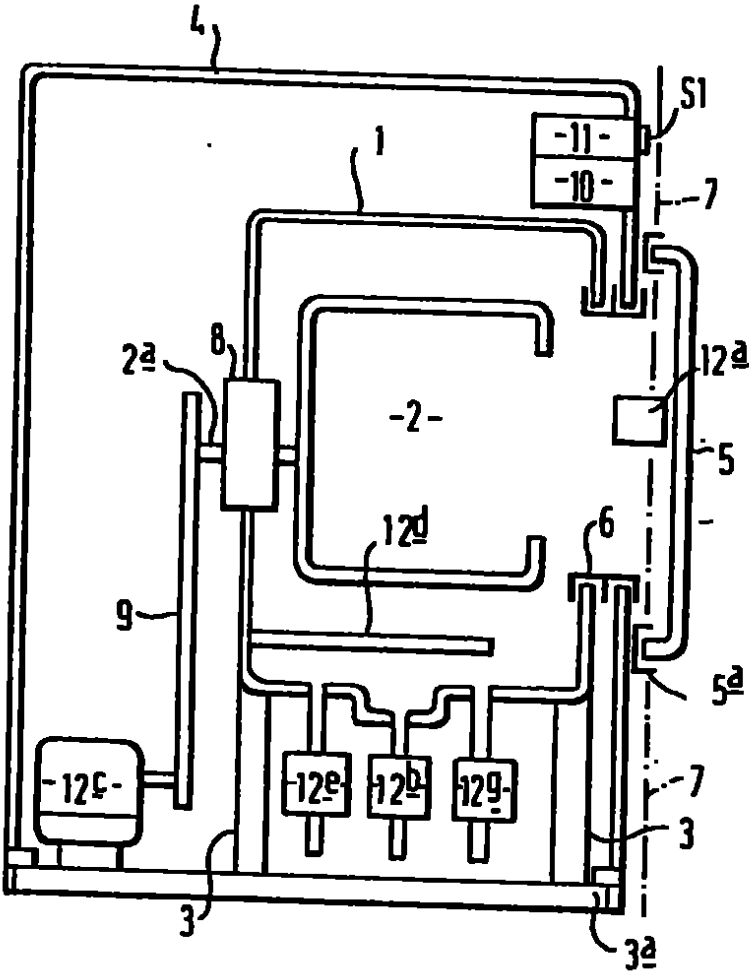
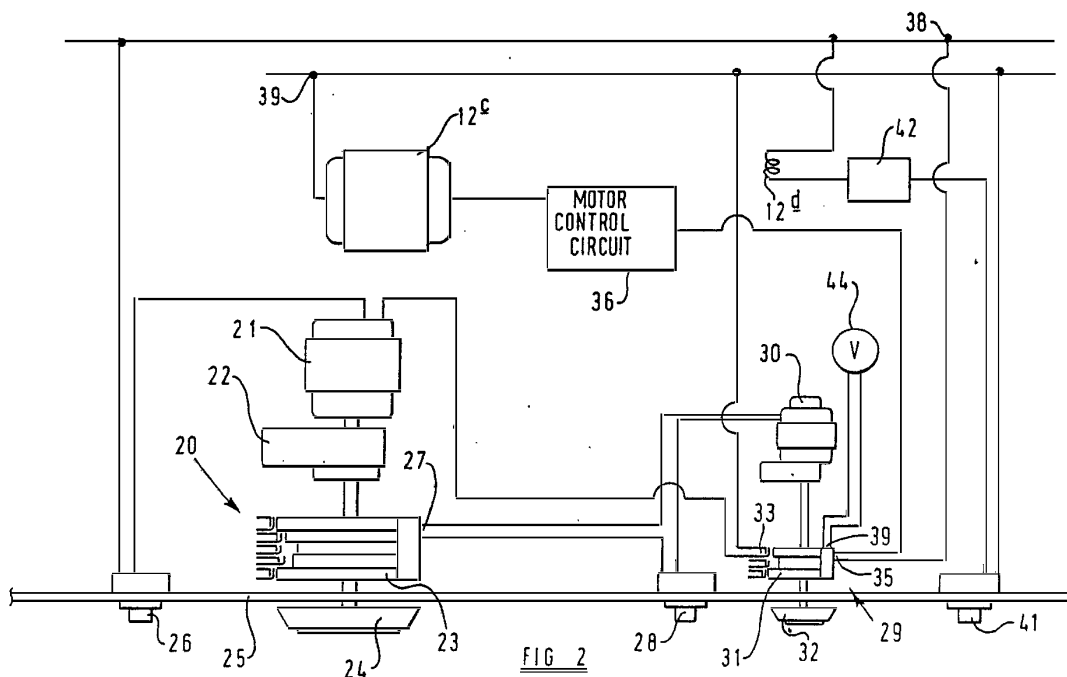


FIG 1



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PATENT SPECIFICATION 759,836

Inventors: GEORGE GILL, ANNIE KATHLEEN GILL and
GEORGE JEFFREY GILL.



Date of filing Complete Specification: Feb. 23, 1954.

Application Date: Nov. 29, 1952. No. 13628/52.

Complete Specification Published: Oct. 24, 1956.

Index at Acceptance: Classes 80(2), D3B1; 138(1), O, and 138(2), A1D1, A1D2 (A: B: C2), A1D4(A: B: C), A1(D5: E: K), A8.

COMPLETE SPECIFICATION
A New or Improved Washing Machine

SPECIFICATION NO. 759,836

INVENTORS: - GEORGE GILL, ANNIE KATHLEEN GILL and GEORGE JEFFREY GILL.

By a direction given under Section 17(1) of the Patents Act 1949 this application proceeded in the name of George Gill Washing Machines Limited, a British company, of Rock House, Snailewell Gardens, Pudsey, Yorkshire.

THE PATENT OFFICE,
5th December, 1956

DB 40894/1(7)/3831 100 11/56 R

25 invention is characterised by the feature that the impeller means comprises a hollow impeller element within the interior of which the articles and washing liquid are disposed during the washing operation, said impeller element being spaced from the interior of the casing to provide therebetween a space for washing liquid, an opening in the lower part of the hollow impeller element to provide communication therethrough between said space and the interior of the impeller element, a plurality of baffles provided on the interior 35 of the casing so as to project inwardly therefrom towards the hollow impeller element, said baffles being spaced circumferentially around the interior of the casing, said impeller element having a plurality of peripheral projections spaced around its axis of rotation and adapted at their outer peripheries to pass across the adjacent inner edge of each of said casing baffles, during the rotational movement of the impeller element, each of said 45 projections being of tapering configuration [F.

portions extending parallel to or at an inclination to the axis of rotation of the impeller element, which corner portions constitute the peripheral projections aforesaid on the impeller element and are adapted to pass sufficiently closely to the baffle means during the rotation of the impeller element as to effect the aforesaid piling up effect of the washing liquid on the rear side of each baffle means in the direction of rotation of the impeller element. Preferably the impeller element is of regular hexagonal configuration. 70 75

Preferably the baffle means would be constituted in each case by a rib or fin-like projection extending vertically or at an inclination to the vertical and projecting substantially radially inwardly from the interior of the hollow casing, in which event the casing may be of circular configuration when viewed in plan. 80 85

Although it is within the scope of the invention that the impeller element itself should serve also as a basket for receiving the 90

PATENT SPECIFICATION 759,836

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COMPLETE SPECIFICATION

A New or Improved Washing Machine

We, FISHER & LUDLOW LIMITED, a British company, of Kingsbury Road, Birmingham, 24, Warwickshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to a new or improved machine for use in washing clothes and other articles and is concerned with that particular kind of such machine which comprises an outer hollow casing within the interior of which the washing liquid and articles to be washed are disposed during the washing operation, impeller means mounted for rotation within said casing about a substantially vertical axis, and means for imparting rotational movement to said impeller means to subject the articles and washing liquid to relative movement so as to perform the desired washing action.

A machine in accordance with the present invention is characterised by the feature that the impeller means comprises a hollow impeller element within the interior of which the articles and washing liquid are disposed during the washing operation, said impeller element being spaced from the interior of the casing to provide therebetween a space for washing liquid, an opening in the lower part of the hollow impeller element to provide communication therethrough between said space and the interior of the impeller element, a plurality of baffles provided on the interior of the casing so as to project inwardly therefrom towards the hollow impeller element, said baffles being spaced circumferentially around the interior of the casing, said impeller element having a plurality of peripheral projections spaced around its axis of rotation and adapted at their outer peripheries to pass across the adjacent inner edge of each of said casing baffles, during the rotational movement of the impeller element, each of said projections being of tapering configuration

in a radially outward direction so as to be of minimum width adjacent their outer periphery at a position most remote from the axis of rotation of the associated impeller element so that as each of said projections approaches each casing baffle in consequence of the rotation of the impeller element, washing liquid on the rear side (in the direction of rotation of the impeller element) of the baffle is subjected to an increase in pressure so as thereby to be piled up on said rear side of each baffle and forced back into the interior of the impeller element through an opening in the upper part thereof, thereby maintaining a continuous circulation of washing liquid through the interior of the impeller element past the articles to be washed therewithin.

The impeller element is preferably of polygonal form peripherally so as to have a plurality of (namely between three and twelve inclusive) mutually inclined peripheral faces separated from one another by corner portions extending parallel to or at an inclination to the axis of rotation of the impeller element, which corner portions constitute the peripheral projections aforesaid on the impeller element and are adapted to pass sufficiently closely to the baffle means during the rotation of the impeller element as to effect the aforesaid piling up effect of the washing liquid on the rear side of each baffle means in the direction of rotation of the impeller element. Preferably the impeller element is of regular hexagonal configuration.

Preferably the baffle means would be constituted in each case by a rib or fin-like projection extending vertically or at an inclination to the vertical and projecting substantially radially inwardly from the interior of the hollow casing, in which event the casing may be of circular configuration when viewed in plan.

Although it is within the scope of the invention that the impeller element itself should serve also as a basket for receiving the

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clothes or other articles to be washed, we find that most satisfactory results are obtained if within the interior of the hollow impeller element is disposed a separate inner container for the clothes and similar articles to be washed, provision being made for oscillating, during the washing operation, this separate container about the axis of rotation of the impeller element.

Preferably the machine would be adapted to serve also as a centrifugal drier for drying the articles after washing, in which case provision would also be made for imparting unidirectional rotational movement to this container at a speed sufficiently high to effect centrifugal drying, for example, of the order of 600 to 900 r.p.m. Alternatively, where this inner container is omitted provision would then be made for rotating during drying the impeller element at this relatively high speed which would in practice be substantially higher than the speed of rotation requisite to perform its function in effecting the above described circulatory movement of the washing liquid.

The arrangement in any event permits of one and the same machine being employed both for washing and drying of the clothes or other articles to be washed.

The invention is illustrated in the accompanying drawings wherein:

Figure 1 is a perspective view of one form of machine in accordance with this invention and intended for use as a domestic washing machine for washing clothes and similar articles.

Figure 2 is a sectional plan view to an enlarged scale of the machine depicted in Figure 1.

Figures 3 and 4 are sectional views on the lines 3-3 and 4-4 respectively of Figure 2.

Figures 5 and 6 are sectional plan views on the lines 5-5 and 6-6 respectively of Figure 4.

Figure 7 is a sectional view in elevation of the same machine but taken on the lines 7-7 of Figure 2.

Figures 8 and 9 are sectional views on the lines 8-8 and 9-9 respectively of Figure 7.

Figure 10 is a part sectional plan view to an enlarged scale of a detail of the same construction.

Figure 11 is a sectional view on the lines 11-11 of Figure 10.

Figure 12 is a sectional view of part of the impeller element depicting a modification of the construction shown in Figures 1 to 11.

Referring to the construction depicted in Figures 1 to 11 of the drawings and initially in particular to figures 2 and 4 of the drawings, the machine there illustrated comprises a sheet metal body 15 of generally rectangular configuration so as to be of substantially square form in plan, such body being open at its upper end and provided internally substantially midway between its upper and

lower ends with a horizontal partition plate 16 which serves to divide the body into two portions, namely, an upper casing receiving portion 17 and a lower driving mechanism containing compartment 18.

Disposed within this upper portion 17 is an outer hollow casing 20 comprising an upstanding vertical wall 21 of cylindrical configuration and formed at its lower end with an integral horizontal base 22 having a central opening of diameter substantially half that of the casing.

The casing 20 has an overall diameter equal to the internal dimension of the square shaped body 15 and is secured to each of the medial portions 23 of the sides 24 of this square shaped body, at each of which positions the casing is further provided internally with baffle means 25 which as illustrated in each case take the form of a vertically disposed rib or fin extending for the full depth of the casing and projecting radially inwardly towards the centre thereof.

The opening in the centre portion of the casing base 22 is closed by a disc-like closure member 26 which projects below a corresponding opening in the partition plate 16, this closure member 26 being apertured centrally so as to constitute a bearing for supporting the upper end of a driving sleeve 27 rotatable about a vertical axis passing through the centre of the body 15 and casing 20 therein.

The upper end of this driving sleeve 27 is connected to the base 28 of a hollow impeller element 29 of polygonal, namely, regular hexagonal form in plan, so that the side walls 30 of this impeller element comprise six similar peripheral flat faces 31 mutually inclined to one another and separated from one another by vertically extending corners 32 which extend parallel to the vertical axis of rotation of the impeller element 29. As will be apparent from the drawings this impeller element is open, i.e. has an opening, namely, an open mouth, at its upper end.

The overall dimension of the impeller element measured between the corners thereof is, as will be apparent from Figure 2, slightly less than the distance between a pair of diametrically opposed baffle means 25, and the peripheral corners 32 of the impeller element constitute peripheral projections spaced around the periphery of the impeller element, which projections by reason of the hexagonal configuration of the periphery of the impeller element are necessarily of tapering form in a direction which is radial outwardly in relation to the axis of rotation of the impeller element so that each of these projections is of minimum width in a direction circumferentially of the impeller element. These projections are adapted to pass successively across the radially inner edges of the baffle means during the rotational movement of the

impeller element so as to co-act with the baffle means in the manner hereinafter described in producing the requisite circulation of washing liquid within the casing 20.

- 5 As will be apparent from a consideration of Figure 2, a space 33 is provided between the periphery of the impeller element and the interior of the casing walls 21 which is adapted to receive washing liquid.
- 10 The side walls 30 of the impeller element are devoid of openings therethrough, while a number, conveniently six openings 34, are provided in the impeller element base adjacent to each of the six corners 32 thereof as clearly
- 15 shown in Figure 2.

Mounted for rotation within the interior of the impeller driving sleeve 27 is a driving shaft 35 of tubular configuration which projects above the sleeve 27 through an opening in the base of the impeller element, which opening is provided with a liquid tight seal 36, and this shaft 35 extends within the interior of the hollow impeller element 29 and is provided at its upper end with a coupling indicated generally at 37 and shown more particularly in Figure 3, which coupling is constructed as described in our Complete Specification No. 28473/52 (Serial No. 759,839) which coupling serves to transmit the drive from the shaft

20 35 to a container 38 disposed within the interior of the impeller element 29 and adapted to receive the clothes or other articles to be washed.

This container is of hollow cylindrical configuration with its upper end open to provide it with an open mouth, the container having an integral base 39 formed with a central opening of diameter appreciably larger than the overall diameter of the shaft 35, the container base adjacent such opening being secured to the lower end 40 of a supporting sleeve 41 which surrounds the upper part of the container driving shaft 35.

The lower end 40 of this sleeve 41 is cylindrical and the remainder of the sleeve is upwardly tapered, the upper end of the sleeve being secured to the driven element of the coupling 37 so as to be driven from the shaft 35 as described in our specification

45 aforesaid. As therein described the construction of the coupling 37 is such as to ensure that if the container 38 is eccentrically loaded, as will commonly be the case in practice, the container can tilt so as to bring its centre of gravity when loaded co-incident with its axis of rotation, or at any rate nearer to such axis than would otherwise be the case, thus reducing or eliminating vibration and out of balance stresses on the driving shaft 35 arising from such eccentric loading of the container

50 38. Such tilting movement of the container is controlled by and cushioned by a rubber or other resilient washer 42 disposed between the lower cylindrical portion 40 of sleeve 41 and the driving shaft 35 therewithin.

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The container 38 is formed both in its cylindrical side wall and in its base with a large number of holes 43 of size sufficiently small as to preclude the passage therethrough of the articles to be washed, such holes serving to ensure that the washing liquid can circulate freely past and through the articles during washing, and in particular the holes in the base of the container serving to facilitate drainage therefrom of sludge and scum while the holes in the container side wall permit of the passage therethrough of the washing liquid during drying.

The container is provided internally with a pair of diametrically opposed vertically extending ribs 44 which serve to impart an irregular movement to the clothes and washing liquid during the washing operation as hereinafter described, and the upper end of each of these ribs is spaced a short distance below the container mouth so as during washing to avoid undue splashing in the neighbourhood of the mouth.

The open upper end of the body 15 is provided internally with a peripheral downwardly flanged stiffening ring 45 beneath which is disposed an anti-splash ring 46, the inner end of which is downwardly directed and spaced a short distance above the mouth of the container 38.

The driving mechanism for the machine will now be described. This mechanism comprises a driving electric motor 47 housed with the other parts of the mechanism within the aforesaid compartment 18, the driving shaft of this motor having a belt drive to a lay-shaft 48 extending vertically within the compartment 18 to one side of the central vertical axis of the body 15.

This lay-shaft 48 is connected through a belt drive 49 to a sleeve-driving pulley 50 which is connected permanently to the impeller driving sleeve 27, so that the impeller element 29 will be rotated continuously at a constant speed conveniently of 120 r.p.m. so long as the driving motor 47 is running.

The lay-shaft 48 as shown in Figure 6 is provided at its lower end with a gear wheel pinion 51 which meshes with a driven gear wheel 52 mounted on the lower end of a vertical spindle 53 carried by bearing bracket 54, this gear wheel 52 carrying on its under side a crank pin 55 which through a connecting rod 56 serves to impart oscillatory movement to an arm 57, which arm as shown in Figure 11 is supported pivotally from a vertically extending pin 58 carried by a further bearing bracket 59 supported like the bracket 54 from the lower part of the body 15.

This oscillatory driven arm 57 has secured to its under side a pair of superposed driving plates 60, 61 connected to one another and to the arm 57 by bolts 62, each of which bolts carries intermediate its two ends a tubular driving abutment 63.

123 124

The driving plates 60 and 61 are spaced apart except near their centres and in the space therebetween is disposed a chain driving wheel 64 of disc-like configuration and formed as shown in Figure 10 with a pair of similar arcuate slots 65, in each of which slots is disposed a pair of helically coiled compression springs 66, one end of each spring engaging with an abutment face 67 provided by one of the ends of the two slots, the opposite end of each spring engaging on one of two opposite sides of one of the two driving abutments 63, each of which abutments with its associated bolt 62 extends within one of the slots 65 so as to be displaceable along the length thereof.

The arrangement is such that according to which direction the arm 57 is pivoted by its connecting rod drive, the motion is transmitted to the chain driving wheel 64 through one or the other of the two springs 66 in each of the two slots 65 which thereby provide a resilient driving connection to the chain wheel 64, which chain wheel through a chain drive 68 drives, as shown in Figure 7, a washing drive clutch member 69 freely rotatable around container driving shaft 35, above which clutch member 69 is disposed a driven clutch member 70 having lower and upper clutch faces 71, 72, this clutch member 70 being slidably keyed to shaft 35.

The clutch member 70 is capable of occupying three vertical positions in relation to the shaft 35 to which it is slidably keyed, namely, an intermediate neutral position as depicted in Figure 7 and a lower washing position in which it engages clutch member 69 so that an oscillatory movement is then transmitted to the container 38, the provision of the springs 66 in the drive to which serves to avoid sudden reversals of the movement of the container 38 during its oscillation thus avoiding corresponding undesirable high stressing of the various parts of the oscillatory drive to the container at the beginning and end of each oscillatory movement.

Conveniently, the arrangement is such that during washing, the container performs thirty complete oscillations per minute, the amplitude of each oscillation being approximately 225 degrees.

In the upper or third position of the clutch member 70, the clutch face 72 on the upper side thereof engages with a drying clutch member 73 provided on the lower side of a driven pulley 74 mounted for free rotation on the lower end of shaft 35 and driven constantly through a belt drive 75 from the layshaft 48. The arrangement is such that in this position of the clutch member 70, the shaft 35 is driven unidirectionally to rotate the container 38 at a relatively high speed of the order of 800 to 900 r.p.m. to effect centrifugal drying of the clothes or other articles after the conclusion of the washing operation.

For draining the casing 20 at the conclusion of the washing operation preparatory to drying, there is provided a pump 76 connected permanently to the electric motor shaft so as to be constantly driven therefrom, the suction side of which pump is connected through a main inlet pipe 77 (see Figure 6) to a suction pipe 78, which suction pipe communicates through a valve 79 with a drainage opening indicated diagrammatically at 80 in the base of the casing 20, this valve 79 having a link connection 81 to an operating knob 82 provided above the reinforcing ring 45 adjacent the top of the machine.

The outlet side of the pump 76 is connected to one end of a discharge hose 83, which discharge hose extends upwardly adjacent one corner of the square shaped body 15 above the anti-splash ring 46 so as there to provide a flexible discharge end 84, which during the washing operation may rest as shown in Figure 4 on the upper surface of the reinforcing ring 45.

During the washing operation the valve 79 would be closed, being opened at the conclusion of the washing operation whereupon the flexible discharge end 84 of the discharge hose 83 would be directed to a sink or drain to effect emptying of the casing 20 through the drainage opening 80 in the base thereof.

In order to dispose of any excess liquid or scum on the top of a substantially completely filled casing 20, the container driving shaft 35 is made of hollow construction and its upper end communicates with the interior of the upper part of the container 38 through a hollow threaded plug 85 whose function is described in our co-pending specification No. 28473/52 (Serial No. 759,839) aforesaid.

The lower end of this driving shaft 35 shown in Figures 4 and 7 communicates with one end of an overflow pipe 35a, the opposite end of which communicates with the suction pipe 78, thus any excess liquid or scum at a level above the level of the top of the threaded plug 85 can flow down the interior of the hollow shaft 35, thereby enabling it to be discharged by the user directing the discharge end 84 of the flexible hose into a sink or drain as above described.

The particular construction of washing machine above described is adapted also to be used in the preparation of foodstuffs, namely, in the mixing of ingredients as well as in the preparation of vegetables and the like as described more particularly in our Specification No. 2403/53 (Serial No. 759,849) for which purpose as described in this latter co-pending specification a mixing bowl would be mounted removably within the interior of the container 38 so as to be positively driven from the upper end of the threaded plug 85 which is made of non-circular form for this purpose and accordingly constitutes a driving portion.

In such operation it is required that the driving shaft 35 which drives the container 38 should be driven unidirectionally at a speed of the same order as that of the impeller element 29, substantially lower than the speed requisite for centrifugal drying, and to enable the driving shaft to be driven at such lower unidirectional speed the shaft at a position above the pulley 74 has secured to it a driven mixing clutch element 86 above which is co-axially slidably but non-rotatably mounted on driving sleeve 27, a driving mixing clutch element 87 which when engaged with the driven element 86 serves to drive the shaft 35 and thus the mixing bowl mounted thereon at the impeller element speed, i.e. 120 r.p.m.

The clutch member 70 and the driving clutch element 87 are both adapted to be operated from a single operating control, and for this purpose they are each provided with separate clutch operating forks 88 and 89 respectively, the construction of one of which forks is depicted in Figure 9.

Each fork is pivoted at 90 intermediate its two ends and the free end of the clutch operating fork 88 is pivoted to the lower end of a link 91, the upper end of which is pivoted to a cam plate 92 mounted on one end of a horizontal spindle 93 connected through bevel gearing 94 (see Figure 8) to the lower end of a vertical control shaft 95, the upper end of which projects above the reinforcing ring 45 and carries a control knob 96.

The cam plate 92 is provided with four peripheral recesses, three of which recesses indicated at 97, 98 and 99 are merely detent engaging recesses and the fourth of which recesses indicated at 100 is a cam recess, the recesses being spaced equi-distantly around the periphery of the cam plate which as indicated is of generally circular configuration.

These recesses are each adapted to engage with a detent 101 carried on the upper side of clutch operating fork 89 near the outer end thereof, which outer end is biased upwardly by a spring 102.

Accordingly the control knob 96 and its associated cam plate 92 can occupy four different positions, namely, the neutral position illustrated in full outline in Figure 7 in which the recess 97 engages with detent 101, in which position the mixing driving clutch element 87 is disengaged and the clutch member 70 is also disengaged i.e. no drive is transmitted to the container 38, the impeller element 29 only rotating under these circumstances provided that the current supply to the motor 47 is switched on.

On turning the control knob 96 so as to rotate the cam plate through 90° in a clockwise direction as illustrated, the recess 98 will engage with the detent 101 and at the same time the link 91 is pulled upwardly to effect displacement of the clutch member 70 into

engagement with the washing clutch member 69 to effect the above described oscillatory movement of the container 38.

When it is now desired to effect drying of the articles within the container 38, the control knob 96 is turned to rotate the cam plate 92 through 180° in an anti-clockwise direction to engage recess 99 with detent 101, thereby displacing the link 91 and associated end of clutch operating fork 88 in a downward direction to engage clutch member 70 with drying clutch member 73 and thus effect unidirectional rotation of the container 38 at drying speed.

The two operative positions of the clutch operating fork 88 are indicated in dotted outline in Figure 7 and it will be understood that during both the washing and the drying operation the impeller element 29 is constantly driven.

In each of the three positions of the cam plate 92 as so far described, the free end of the clutch operating fork 89 remains in the horizontal position depicted in full outline in Figure 7 i.e. the clutch elements 86 and 87 remain disengaged.

When mixing or other operation in the preparation of foodstuffs is required, the control knob 96 is rotated further to engage cam recess 100 with the detent 101 and as the depth of this cam recess is made substantially greater than the depth of the other three recesses on the cam plate, the free end of the clutch operating fork 89 is now permitted to move upwardly under the loading of its spring 102 to engage the two mixing clutch elements 86, 87. In this position the clutch operating fork 88 will occupy the horizontal position illustrated in Figure 7, i.e. the clutch member 70 will be in the neutral position.

Each of the four recesses on the periphery of the cam plate 92 serves by its engagement with the spring loaded detent 101 to retain the cam plate in the position into which it has been turned by the control knob 96.

The electric motor would be provided with a control switch 103 operable from the exterior of the body 15.

As shown the electric motor 47 is mounted for pivotal movement about a vertical axis, the pivot being illustrated at 104 in Figure 5, the motor being loaded by spring 105 for movement in a direction away from the lay-shaft 48, the arrangement ensuring that the belt drive from the motor is maintained under tension and at the same time the motor is not subjected to undesirable vibration.

In the particular arrangement illustrated, the lower end of the hollow driving shaft 35 is supported by a thrust bearing member 106 which serves also as an outlet nipple for connection to the pipe 86.

When it is desired to effect washing of the clothes or other articles, these are placed within the container 38, the casing 20 is

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filled through the open mouth thereof with washing liquid to a depth which may be of the order of two-thirds of the entire depth of the casing dependent upon the quantity of articles to be washed, the electric motor is switched on and the control knob 96 moved into the washing position so as to effect rotation of the impeller element 29 and oscillation of the container 38.

The rotation of the impeller element 29 imparts a certain amount of centrifugal movement to the body of the washing liquid there-within so that this flows out through the openings 34 in the base of the impeller element into the space 33 between this and the side walls 21 of the casing so as there to pile up to a higher level than the level within the interior of the impeller element.

The liquid within this space 33 is subjected locally to pressure at a position on the rear side (in the direction of rotation of the impeller element) of each of the baffle means 25 as the radially outwardly tapered projections constituted by the corners 32 of the hexagonal impeller element successively approach these baffle means so as locally to reduce the radial thickness of this space 33.

Accordingly, liquid is caused to pile up on this rear side of each of the four baffle means 25, the piling up although theoretically intermittent being in practice continuous for the above mentioned speed of rotation of the impeller element. We find that this piling-up action of the liquid with consequent satisfactory circulation of the liquid is effectively achieved by the aforesaid radially outwardly tapered configuration of the projections on the periphery of the impeller element as are, in fact, provided by its hexagonal configuration.

The piling up of the liquid will be sufficient for it to flow over the upper edge of the impeller element inwardly into the interior of the container 38 from which it drains through the holes 43 in the side wall thereof back to the impeller openings 34 so that a continuous circulation of the washing liquid is set up through the container 38 by this piling up action on the rear side of each of the baffle means 25, the liquid, in fact, circulating within the space 33 in both the direction of rotation of the impeller element indicated by the arrow in Figure 2 as well as upwardly over the upper edge of this element.

The liquid is, in fact, found to flow both inwardly and downwardly from the upper edge of the impeller element 29 into the interior of the container 38, and this flow of the washing liquid is sufficient to produce quite a satisfactory washing action with the majority of articles required to be washed without it being necessary to provide the container 38 at all. It is, in fact, within the scope of the invention in its broadest sense that the container 38 should be dispensed

with entirely so that the articles to be washed are in direct contact with the interior of the impeller element 29.

However, by providing the container 38 in addition to the impeller element 29 and subjecting the same to oscillatory movement during the washing action, a very irregular movement is imparted to the articles to be washed, which irregularity is assisted still further by the provision of the ribs 44 on the interior of the container 38 so that an especially effective washing action is obtained by the provision of the container 38 as well.

When the washing action is completed, the control knob 96 is turned to the neutral position, the discharge end 84 of the flexible hose is directed to a sink or drain, the drain valve 79 is opened to effect discharge of the washing liquid from the casing 20, after which the control knob 96 is moved into the drying position to effect unidirectional rotation of the container 38 and centrifugal drying of the articles in the known manner.

In order to increase still further the circulatory movement of the washing liquid produced by the impeller element 29, the side walls 30 of this may be peripherally embossed as indicated at 107 in Figure 12.

Various modifications may be made to the machine from the form above described. For example, the hexagonal shaped impeller element 29 may be of equilateral triangular form in plan so as to have only three sides, or the number of its sides may be increased so that in plan the impeller element has the appearance of a regular twelve sided polygon, increase in the number of sides of the polygon above twelve being considered undesirable as leading to an insufficient pile up of the washing liquid on the rear side of each of the baffle means 25.

The baffle means 25 although preferably extending vertically and parallel to the axis of rotation of the impeller element may be disposed at a small inclination of the order of 10 to 20° to the vertical so that their upper end in the direction of movement of the adjacent part of the impeller element is disposed forwardly in relation to their lower end.

Further to facilitate assembly the periphery of the casing side walls 21 may be spaced inwardly from instead of touching the side walls of the body 15, the casing being then supported by the reinforcing or stiffening ring 45 and the partition plate 16.

Further instead of making the two ribs 44 on the interior of the container of identical configuration, one of these ribs may be shaped differently from the other and may extend in a direction other than the vertical, for example, a horizontal direction and may be replaced by projections of other than rib-like form extending inwardly into the interior of the container, such unsymmetrical form assisting in imparting to the clothes or similar

articles to be washed the desired irregular movement.

Further if desired, an immersion type electric heater may be disposed in the lower part of the casing immediately above the base 22 thereof, i.e. below the base 28 of the hollow impeller element so as to heat the washing liquid prior to and, if desired, during the washing operation.

- 10 Although the invention has been specifically described as applied to a machine for washing clothes and similar articles, the invention may be applied to machines for washing other articles, for example, household utensils such as crockery and cutlery, for which purpose there would be provided a crockery and cutlery receiving basket having compartments for the various utensils concerned, such basket being, for example of known form of the usual open mesh construction, such basket being conveniently adapted to be mounted detachably within the container 38 by the mere operation of positioning the basket on the non-circular turning portion at the upper end of the threaded plug 85 so as to engage non-rotatably therewith, i.e. the basket would then be of generally annular form so that its compartments would be disposed in the space between the container supporting sleeve 41 and the container side wall.

In such application of the invention, the utensils would be washed and dried in manner similar to the case of clothes and like articles as already described.

What we claim is:

1. A machine for washing clothes and other articles of the kind comprising an outer hollow casing within the interior of which the washing liquid and articles to be washed are disposed during the washing operation, impeller means mounted for rotation within said casing about a substantially vertical axis, and means for imparting rotational movement to said impeller means to subject the articles and washing liquid to relative movement so as to perform the desired washing action, characterised by the feature that the impeller means comprises a hollow impeller element within the interior of which the articles and washing liquid are disposed during the washing operation, said impeller element being spaced from the interior of the casing to provide therebetween a space for washing liquid, an opening in the lower part of the hollow impeller element to provide communication therethrough between said space and the interior of the impeller element, a plurality of baffles provided on the interior of the casing so as to project inwardly therefrom towards the hollow impeller element, said baffles being spaced circumferentially around the interior of the casing, said impeller element having a plurality of peripheral projections spaced around its axis of

rotation and adapted at their outer peripheries to pass across the adjacent inner edge of each of said casing baffles during the rotational movement of the impeller element, each of said projections being of tapering configuration in a radially outward direction so as to be of minimum width adjacent their outer periphery at a position most remote from the axis of rotation of the associated impeller element so that as each of said projections approaches each casing baffle in consequence of the rotation of the impeller element, washing liquid on the rear side (in the direction of rotation of the impeller element) of the baffle is subjected to an increase in pressure so as thereby to be piled up on said rear side of each baffle and forced back into the interior of the impeller element through an opening in the upper part thereof, thereby maintaining a continuous circulation of washing liquid through the interior of the impeller element past the articles to be washed therewithin.

2. A washing machine for the purpose described comprising an outer hollow casing adapted to contain washing liquid, a hollow impeller element within the interior of which the articles and washing liquid are disposed during the washing operation and mounted within the casing for rotation about a substantially vertical axis, said impeller element having its periphery spaced inwardly from the inner surface of the casing, means for imparting rotational movement to the impeller element, said impeller element having liquid discharge openings in the lower part thereof adapted to permit of washing liquid flowing from the interior of the impeller element into the space between this and the casing, baffle means on the interior of the casing spaced around the periphery thereof, said impeller element being of polygonal form peripherally so as to have a plurality of, namely, between three and twelve inclusive, mutually inclined peripheral faces separated from one another by corner portions extending parallel or at an inclination to the axis of rotation of the impeller element, which corner portions are adapted to pass sufficiently closely to the baffle means during the rotation of the impeller element as to cause, under the pressure exerted by the impeller element sides as they approach each baffle means in turn, washing liquid on the rear side of each baffle means in the direction of rotation to be forced into the upper part of the impeller element through an opening in the upper part thereof, so as thereby to maintain a continuous circulation of washing liquid through the interior of the impeller element and relative to the articles to be washed.

3. A machine according to Claim 2 characterised in that the impeller element is of regular hexagonal configuration peripherally when viewed in plan.

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4. A machine according to any of Claims 1 to 3 wherein the baffle means at the inner side of the hollow casing are constituted by vertically or substantially vertically extending ribs which project inwardly from the inner side of the casing.

5. A machine according to any of Claims 1 to 4 characterised by the provision of a hollow container separate from the impeller element and disposed therewithin, which container is adapted to contain the articles to be washed, the container having a plurality of openings in its walls for the passage of washing liquid and being mounted for rotation about a vertical axis, and means for imparting oscillatory movement to the container about said axis to assist the washing action produced by the said circulatory movement of the washing liquid induced by the rotation of the impeller element.

6. A machine according to Claim 5 characterised by the provision of a plurality of inwardly extending projections on the interior of said container, for the purpose specified.

7. A machine according to Claim 5 or 6 characterised in that the oscillatory movement of the container is transmitted thereto through an oscillatory driven driving member connected to the container through the medium of a damping device adapted to transmit the drive non-positively to the container and effect smooth acceleration and deceleration thereof at the commencement and ending of each working stroke.

8. A machine according to Claim 7 characterised in that the damping device comprises driving and driven elements connected one to the container and the other to the oscillatory driven driving member and each mounted for oscillatory movement about a common axis, one of these two elements comprising a pair of coiled springs of arcuate form and a housing therefor, which springs and housing are arranged concentrically with the axis of oscillation of the said driving and driven elements, said two springs having opposed driving faces at one end thereof, the other element comprising an abutment working between said opposed spring faces, the opposite ends of each spring being in driving engagement with their associated element, the arrangement being such that if one of these two elements is oscillated in one or the other direction about said axis, the movement is transmitted between said abutment and one or the other of the two springs resiliently to the other element.

9. A machine according to any of Claims 5 to 8 characterised by the provision of means for effecting unidirectional rotation of the container to effect centrifugal drying of the articles after the conclusion of the washing operation.

10. A machine according to any of claims 5 to 9 characterised by the provision of a

single control means manually operable by the user for effecting as required by the user continued rotation of the impeller element and oscillation of the container for performing the washing operation, continued rotation of the container to perform a drying operation, and continued rotation of the container at a speed lower than that requisite for drying for use in a mixing or other food-stuffs preparation operation.

11. A machine according to any of Claims 5 to 10 characterised in that the container and impeller element are connected respectively to the upper end of an inner shaft and an outer sleeve surrounding said shaft concentric therewith, said shaft and sleeve being both supported for rotation about a vertical axis with the shaft extending above the upper end of the outer sleeve, and means being provided for transmitting the driving movement to both the shaft and the sleeve.

12. A machine according to any of the preceding claims characterised by the provision of means for effecting continued withdrawal of surplus washing liquid and/or scum from the interior of the hollow casing.

13. A machine according to Claim 12 characterised by the provision of a pump adapted to effect discharge of the washing liquid from the casing, which pump is driven continuously during the operation of the machine, a manually operable valve being provided for controlling the discharge of the washing liquid from the casing by the pump, the outlet of said pump being connected to one end of a flexible pipe capable of directing the washing liquid discharged by the pump into a drain or other external receptacle as desired.

14. A machine according to Claims 11 and 12 characterised in that said inner shaft extends into the interior of the container to a position nearer the top than the bottom thereof, said shaft being hollow throughout its length and having its lower end in communication with a power driven suction pump provided on the machine, the pump having an outlet for directing the excess liquid and/or scum to a drain or other external receptacle.

15. A machine according to Claim 14 characterised in that the lower end of said driving shaft is mounted for rotation upon a thrust bearing which provides also an outlet connection to a pipe leading from the lower end of said hollow shaft to the pump.

16. A machine according to Claim 10 and any of Claims 11 or 14 or 15 characterised in that the manually operable control means comprises a rotatably mounted operating member mechanically connected to a rotatably mounted cam member, said cam member having a cam portion adapted in one position thereof to engage with a cam follower associated with a mixing clutch operating member for effecting engagement of

a clutch connecting said container driving shaft to a unidirectional power driven driving member, said cam follower being spring loaded into engagement with said cam portion to effect said mixing clutch engagement, the cam member being mechanically connected to a second clutch operating member connected to a clutch member slidably but non-rotatably connected to said container driving shaft and adapted to occupy three positions corresponding to three further positions of the cam member, namely, a neutral position in which the clutch member is disengaged, a washing position in which it has clutch engagement with an oscillatory driven member for effecting oscillation of the container and a drying position in which it has clutch engagement with a unidirectional power driven driving member, said cam member having three retaining portions spaced around its axis of rotation and each adapted releasably to engage with said spring loaded cam follower to retain the cam member in each of said three further rotational positions.

17. A machine according to Claim 9 and any of Claims 6 to 8, or 10, or 11, or 14 to 16 characterised by the provision of a coupling in accordance with Specification No. 28473/52

(Serial No. 759,839) for driving the container 30 during the washing and drying operations from a power driven driving shaft.

18. A machine according to any of the preceding Claims including a positively driven non-circular driving portion adapted for detachable driving engagement with a mixing bowl or a utensil containing basket.

19. A machine according to Claims 17 and 18 wherein said non-circular driving portion is constituted by a part of the said coupling for driving the container during the washing and drying operations.

20. A machine according to any of the preceding Claims characterised by the feature that the hollow impeller element is peripherally embossed, for the purpose specified.

21. A domestic washing machine for washing clothes and similar articles adapted for drying purposes substantially as hereinbefore described with reference to and as shown in Figures 1 to 11, or 12 of the accompanying drawings.

FORRESTER KETLEY & CO.

Chartered Patent Agents,
Central House, 75 New Street, Birmingham, 2,
and Jessel Chambers, 88/90 Chancery Lane,
London, W.C.2.

PROVISIONAL SPECIFICATION

A New or Improved Washing Machine

We, FIEBER & LUDLOW LIMITED, a British company, of Kingsbury Road, Birmingham 24, Warwickshire, do hereby declare this invention to be described in the following statement:

This invention relates to domestic washing machines, that is machines for use mainly but not exclusively in the home for laundering clothing and like articles, and of the kind having electrically driven means for subjecting the clothing to the washing action of the liquid and also for rough drying them by centrifugal action.

The chief object of the present invention is to provide a machine of this kind which will be simple and cheap to construct and yet will operate with a good washing and rough drying action.

Essentially a machine according to the invention comprises a polygonal clothing receptacle having perforated walls and arranged to be rotated within a polygonal tank in close enough association with the tank walls to force washing liquid through the walls of the receptacle and through the clothing therein and to circulate the liquid. The construction and arrangement is such that a pressure surge of liquid is produced between the walls of tank and receptacle which forces the liquid through the clothes and then causes it to pass back into the outer

part of the tank through apertures in the bottom of the receptacle or elsewhere.

Preferably the receptacle is square in plan with or without the corners removed and is mounted in a square tank having upright webs or projections on its walls arranged to co-operate with the receptacle walls to produce the pressure surge. A two-speed drive is provided for the receptacle, low speed for washing and high speed for rough drying, and preferably this is by a constant speed electric motor mounted beneath the tank and driving the receptacle shaft through a magnetic coupling. This form of drive gives simplicity of construction and ease of control by a two-way switch, and acts as a safety device in case of jamming of the receptacle.

The receptacle shaft can have associated with it and rotatable by it an impeller working in an outlet from the tank, preferably located within a bearing supporting such shaft, and arranged to draw liquid from the tank and either pass it back into the tank through a hose or pipe or alternatively to empty the tank of liquid under control of a two-way valve.

The base of the receptacle may have radial, diagonal or other ribs or projections arranged to assist in balancing an out-of-balance load when drying at high speed.

By the use of the invention the washing

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tank may not need any outer casing as is customary with similar known machines, thereby reducing the cost and the amount of metal needed. Also for the same overall 5 external dimensions a machine according to this invention will enable a larger quantity of

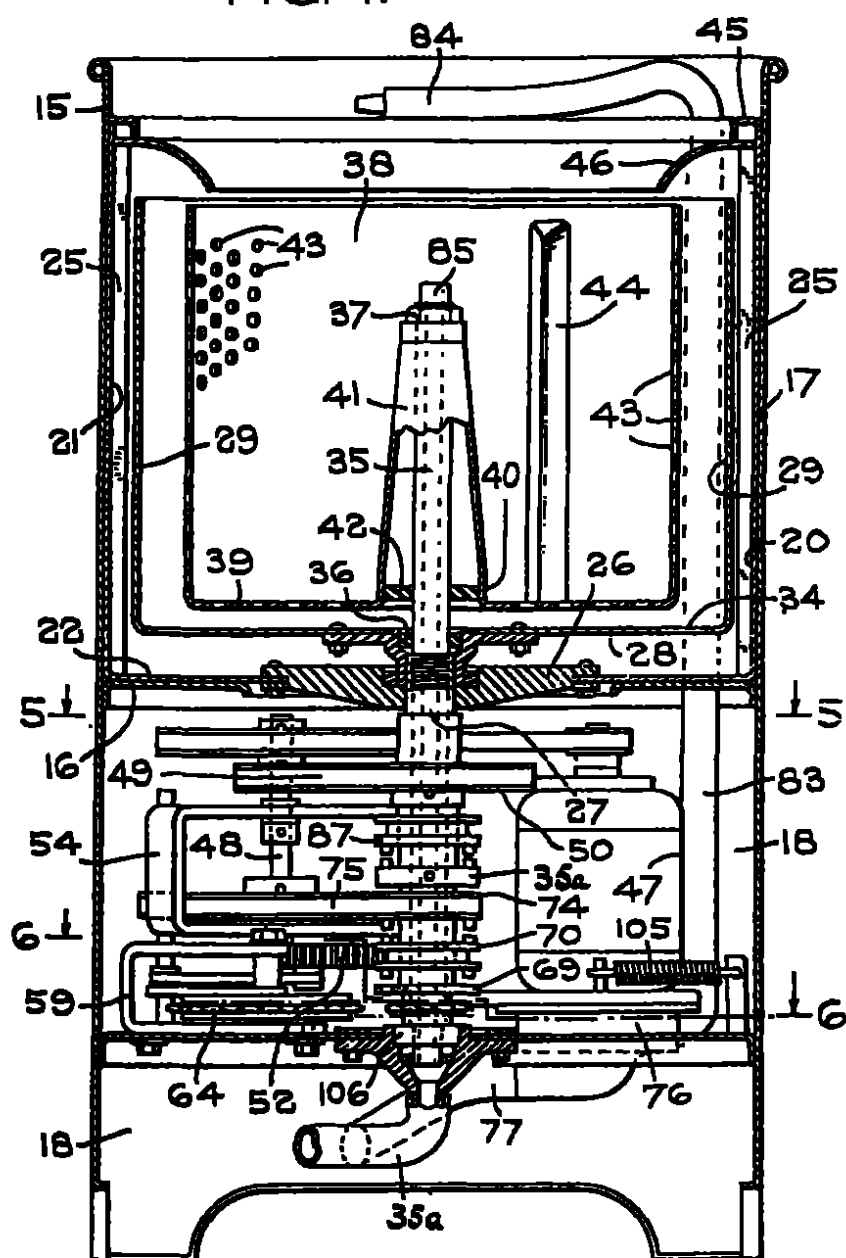
clothes to be dealt with at one time than is possible with previous comparable machines.

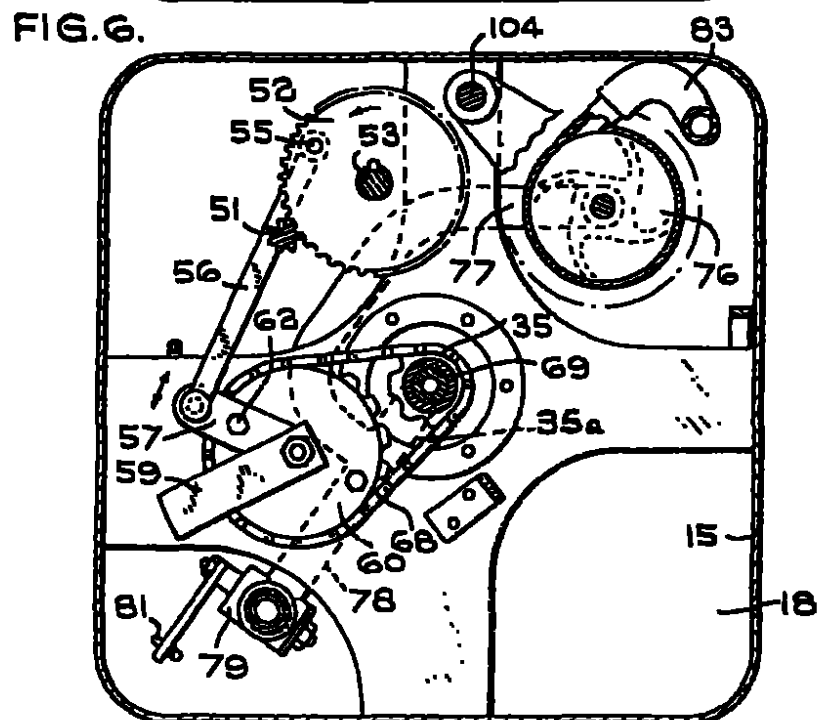
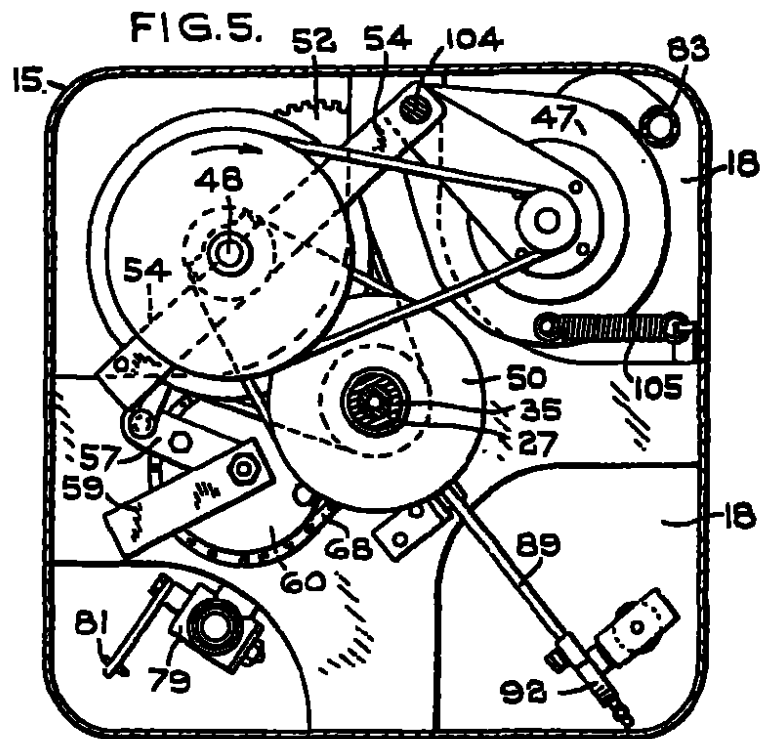
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Chartered Patent Agents,
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Bath: Printed for Her Majesty's Stationery Office, by Dawson & Goodall, Ltd.—1956.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2,
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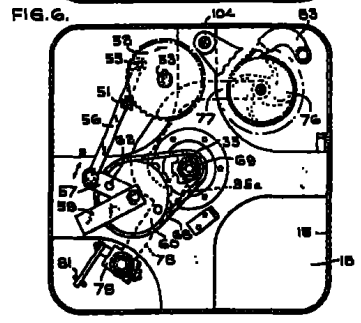
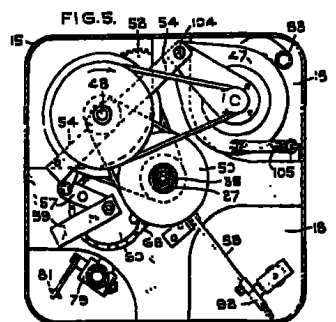
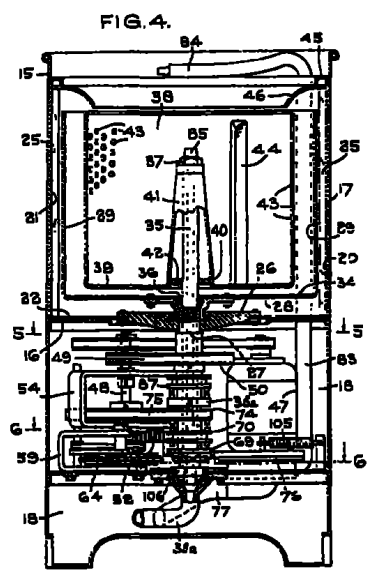
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FIG. 4.





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FIG. 7.

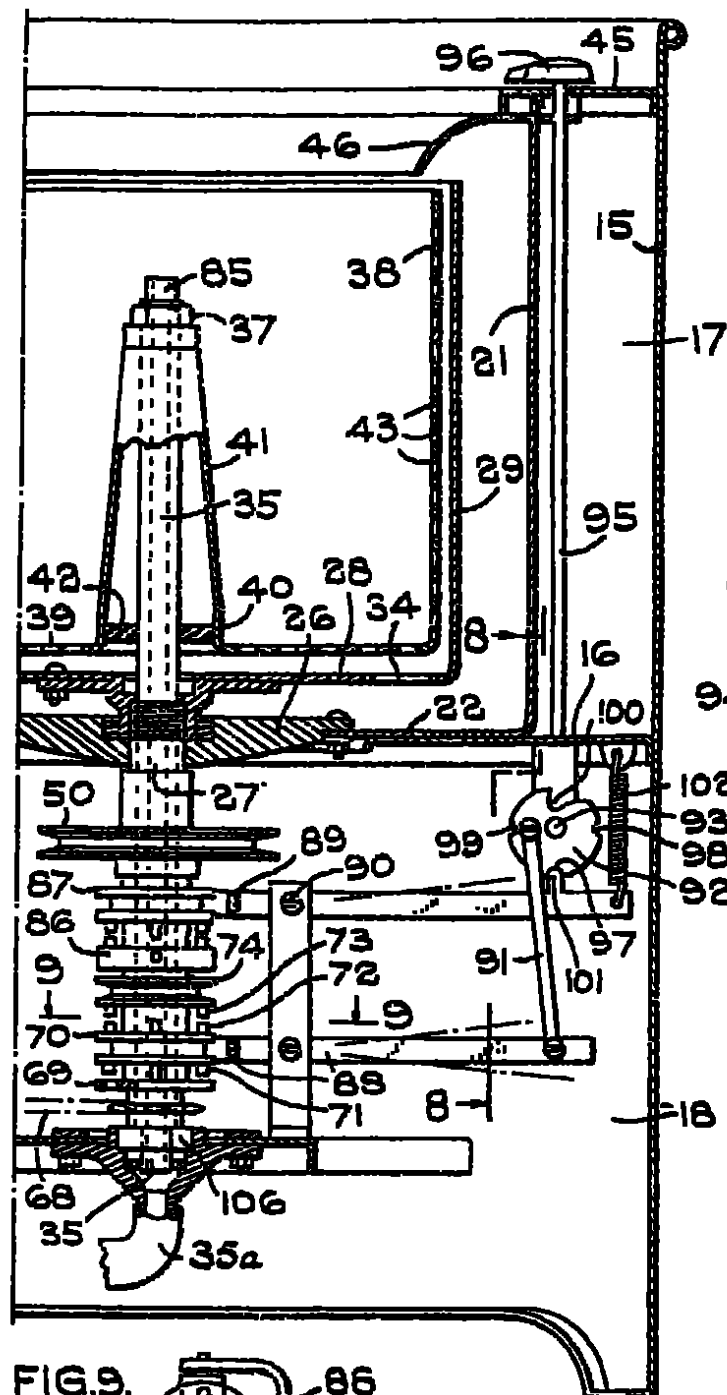


FIG. 8.

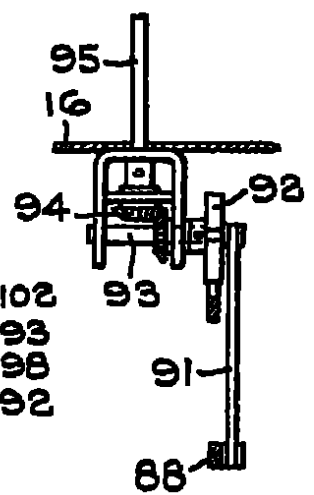
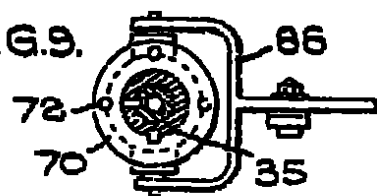


FIG. 9.



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FIG. 8.

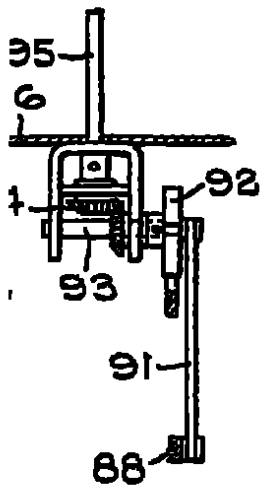


FIG. 10.

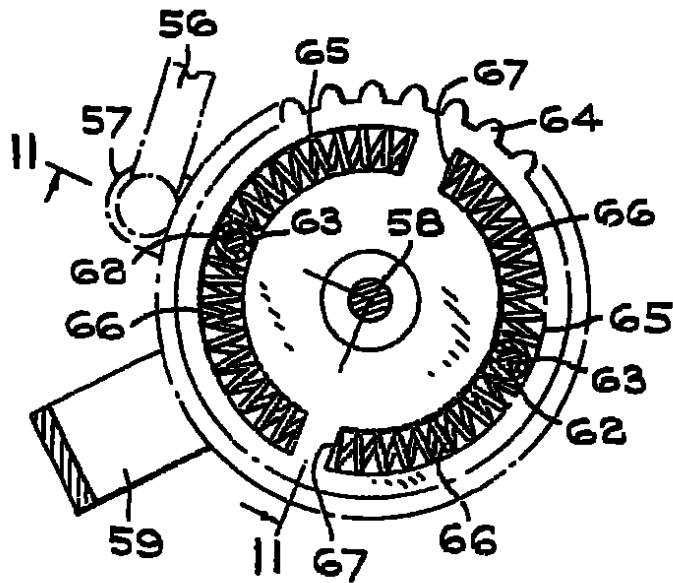


FIG. 12.

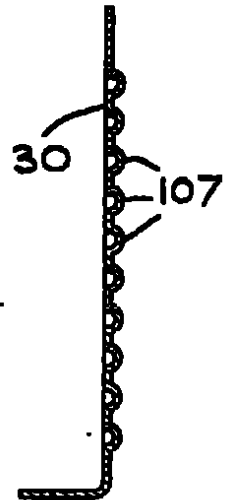


FIG. 11.

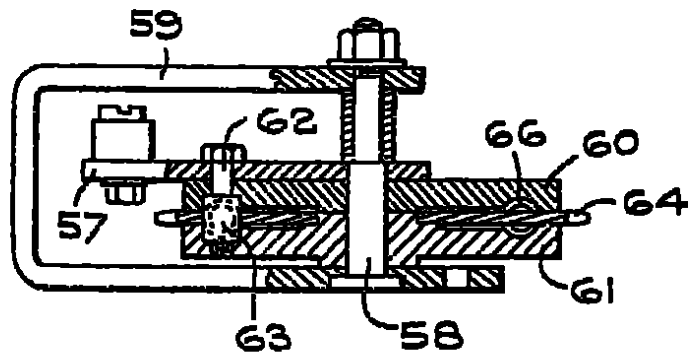


FIG.7.

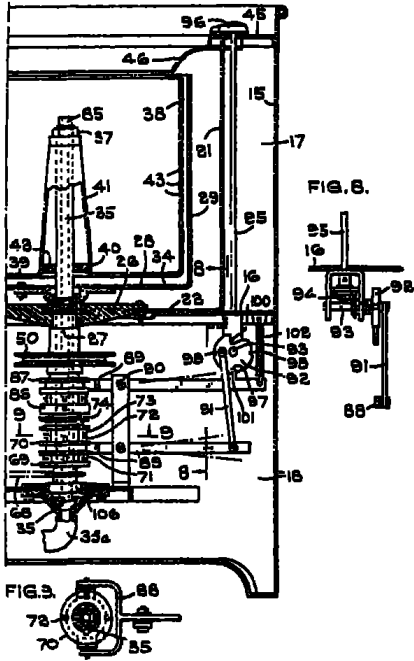


FIG.10.

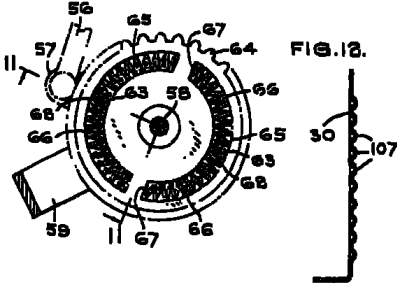
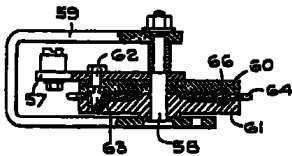


FIG.11.



United States Patent Office

3,063,785

Patented Nov. 13, 1962

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3,063,785

PROCESS FOR CLEANING ATHLETIC UNIFORMS
Clayton E. Foreman, 540 Leslie Drive, Salem, Oreg.
No Drawing. Filed Dec. 14, 1959, Ser. No. 859,112
7 Claims. (Cl. 8-137)

This invention pertains to cleaning processes, and relates particularly to a novel process for the effective cleaning of athletic uniforms. This application is a continuation-in-part of my now abandoned earlier application, Serial Number 728,050, filed April 14, 1958.

The cleaning of athletic uniforms such as football pants and jerseys, heretofore has been so unsuccessful that it has become generally recognized that uniforms of this type have a severely limited useful life. For example it is generally accepted that a football uniform is usable in varsity play for a maximum of a single season, and most often for only a portion of a single season. The reasons for this extremely limited useful life are many: Conventional cleaning practices fail to remove imbedded dirt, and thus the uniform changes color. The retention of dirt also weakens the fibers of the cloth and thus reduces its useful life. Conventional practices also fail to remove grass stains which further discolor the uniforms.

Conventional practices result in such great shrinkage of the uniform that the protective pads can no longer be properly positioned, and hence the athlete becomes subject to the hazards of injury and restricted motion. This problem of shrinkage is so severe that many athletic departments purchase their uniforms as much as two or three sizes larger than required, in order to accommodate the inevitable shrinkage that is to follow.

Conventional cleaning practices often result in the changing of colors of uniforms and of the running of colors one into another. This latter problem is especially critical with striped uniforms wherein sharply defined areas of different colors are important to maintain.

Still further, conventional cleaning practices at their best are time consuming and hence costly, often involving considerable hand work in order to achieve results which, although are the best that can be achieved, leave much to be desired.

Accordingly, it is a principal object of the present invention to provide a process for cleaning athletic uniforms, which process avoids all of the disadvantages enumerated hereinbefore, to effect substantially complete removal of dirt and grass stains while avoiding color changes or color running and while reducing shrinkage to a practical minimum.

Another important object of the present invention is to provide a process for cleaning athletic uniforms, which process may be carried out in a minimum of time and with conventional cleaning equipment.

A further important object of the present invention is to provide a novel spotting solution for use with the present process for removing the most tenacious soil marks and grass stains from athletic uniforms.

The foregoing and other objects and advantages of this invention will appear from the following detailed description:

In its basic concept, the process of the present invention involves the sequential steps of first washing the uniforms in cold water, repeatedly until the water clears, then washing the uniforms in solutions of soap and bleach at progressively elevated temperatures, and then rinsing the uniforms in waters of progressively decreasing temperatures.

Considering the foregoing in greater detail, let it be assumed that it is desired to clean a number of football uniforms which are covered with mud and grass stains. By using a commercial cylinder washer 40 inches long

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and 30 inches in diameter, thirty football pants or thirty football jerseys may be cleaned at one time. For the first step, the articles are placed in the washer with a low level of cold water, i.e. a quantity of water sufficient only to submerge the articles and thus permit considerable scrubbing of the articles as the washer is rotated. In a washer of the size exemplified, this quantity of water is about 18 to 22 gallons. The water may be provided conveniently from the usual cold water tap, and in any case should not exceed about 75° F. The water is drained from the articles and replaced with fresh water, and this procedure is repeated until the water clears, thus indicating that the surface dirt has been removed.

As the second step, a top level of water, about 25 to 30 gallons for the size washer exemplified, is then introduced into the washer at a temperature of from about 100° F. to about 120° F. It is preferred that the higher temperatures be used for cotton material and the lower temperatures be used for striped or lettered articles and for nylon and other synthetic fabrics. Sufficient soap is then introduced into the water to provide an optimum quantity of suds, and the washer operated for a period of at least about five minutes, preferably from five to seven minutes. Many commercial soaps are suitable for this purpose, among which are those available under the trade names of Rintex, Dri-Suds, Sparkle, C-20, and others.

In the third step, the soap solution is then discharged from the washer and the latter charged with a similar top level of water at the same temperature of from about 100° F. to about 120° F. Sufficient soap is added to provide optimum suds, and a small quantity of a soap booster, for example about 4 ounces of a booster such as that available under the name Apache, is added for the purpose of assisting in the release of tenaciously bound dirt such as clay. A small quantity of bleaching compound is also added for the purpose of initiating the bleach of grass stains and colored dirt such as red clay. For this purpose about 16 ounces of a bleaching solution such as those available under the trade names Clorox, Purex and others, is suitable. The washer is operated for a period of about ten minutes, after which the solution is discharged from the washer.

In the fourth step the soap solution then is removed from the washer and a similar top level of fresh water is charged into the washer, at a temperature of from about 120° F. to about 140° F. Sufficient soap is added to provide optimum suds, and a quantity of bleaching agent is added, depending upon the type and character of the cloth. For example, about 48 ounces of Clorox bleaching solution has been found suitable in the present illustration for white cotton articles. For striped or lettered articles of white cotton or nylon the amount of bleach preferably is about 32 ounces. The washer is then operated for a period of at least about twenty minutes, after which the solution is drained from the washer.

In the case of dark colored fabrics it is necessary to substitute the following procedure for the third and fourth steps enumerated above: The washer is charged with a top level quantity of water at a temperature of from about 100° F. to about 120° F., sufficient mild soap such as coconut oil soap is added for optimum suds, and the washer operated for a period of at least about twenty minutes.

In the fifth step for all fabrics, a quantity of rinse water at a temperature of from about 120° F. to about 130° F. is charged into the washer and the latter operated for about five minutes, after which the rinse water is discharged. In the sixth step, a second quantity of rinse water at a temperature of from about 100° F. is then charged into the washer and the latter operated for a

period of about five minutes, after which the rinse water is discharged.

In the event the foregoing treatment has failed to remove completely such stains as red clay, complete removal may be achieved by introducing into the second rinse water from about 2 to 6 ounces of oxalic acid. Additionally, it has been found that whereas successive repetitions of the foregoing treatment tend to darken certain colors, principally yellows and golds, restoration of the original color may be achieved by the oxalic acid-rinse treatment described.

For the seventh step, a final rinse is made with a quantity of cold water, between about 60° and 75° F., to which has been added a small quantity of neutralizer for the bleaching compound or for the soap employed in the foregoing substitute step. For example, in the present illustration, about 2 ounces of a neutralizer has been found to be suitable. Among various suitable neutralizers are those available under the trade names Erosto-Celic, San-i-sour, and others. The washer is operated for a period of about five minutes, after which the rinse solution is discharged.

With the completion of the third rinse the articles are subjected to a spin dry or other procedure by which the excess water is extracted, after which the articles are processed according to their character and type of fabric.

For example, if the articles are football pants of cotton material, they are tumbled dry at a temperature of not more than about 140° F., after which the necessary repairs are made and then they are pressed on a topper.

In the event the articles are football pants of nylon or other synthetic fabric, the procedure following extraction involves hanging the articles to dry at room temperature, after which they are tumbled cold for about five minutes to soften the material preparatory to pressing. The pants are then turned wrong side out, necessary repairs are made, and then they are pressed on a topper.

In the event the articles are football jerseys, they are hung on hangers to dry at room temperature, following extraction. They are then tumbled cold for about five minutes, necessary repairs are made, and then they are pressed on a topper.

Since the foregoing cleaning procedure involves a minimum of shrinkage to the material, the hand manipulations required to arrange the article on the press are sufficient in all cases to bring the article to proper size.

It is quite characteristic of football jerseys that excessive abrasion and staining occur at the elbows. In the event the foregoing cleaning procedure does not completely remove these abrasions and stains, they are readily eliminated by conventional hand spotting procedure with the following solution, the proportions being given as parts by weight: 128 parts water; 96 parts cleaning solvent such as carbon tetrachloride, chloroform, kerosene, or other recognized cleaning solvents; 24 parts soap of the moisture carrying type used in solvents of dry cleaning processes and available under such names as Lustral, Sanitone, Street, and Adco; 16 parts lubricant of the type available under the trade name Neutral; and 4 parts ammonia. A simple quick brushing of this solution over the excessively stained areas generally is sufficient, after which the jersey is rinsed by hand and hung on a hanger to dry at room temperature. When dry, the jerseys are tumbled cold for about five minutes, necessary repairs are made, and then they are pressed on a topper.

It is important to note that in the event it is necessary to use the spotting solution above described, it is used only after the bleaching steps of the cleaning process have been completed. The spotting solution is never used on fresh grass stains or fresh blood, since stains of this type become set in the presence of ammonia. In this regard, it may be desirable in some instances to eliminate the proportion of ammonia from the spotting solution.

It is an important feature of this invention, as ex-

plained hereinbefore, that the articles are subjected to progressively decreasing temperatures of water through the rinsing steps. This procedure is necessary in order to permit the mechanical scrubbing action in the washer in the presence of soap and bleach, without incurring excessive shrinkage.

It is important to note further from the foregoing procedure that certain of the articles are subjected to a bleaching treatment, and that such bleaching is done progressively, first with a mild solution and then with a stronger solution. This is important to the successful removal of stains such as grass and clay stains.

It has been determined that by use of the cleaning procedure described hereinbefore it is possible to effect thorough cleaning of such athletic equipment as football uniforms, to the complete elimination of dirt, bloodstains, grass stains and cleat marks, without incurring change or running of colors and without shrinkage or deterioration of the cloth. Moreover, such uniforms may be cleaned a number of times equivalent to more than four seasons of varsity use, without noticeable deterioration of color and fabric strength. Thus, whereas heretofore the same uniforms have survived a maximum of a single varsity season, the process of the present invention extends the useful life of such uniforms to many seasons. Considering the substantial cost of a single uniform comprising the pants and jersey, the economic advantage of the present process is apparent.

It will be apparent to those skilled in the art that various modifications may be made in the details of the process steps described hereinbefore without departing from the spirit of this invention and the scope of the appended claims.

Having now described my invention and the manner in which the same may be used, what I claim as new and desire to secure by Letters Patent is:

1. The process for cleaning fabrics including cotton, comprising subjecting the fabric while under mechanical agitation to successive washings in water at temperatures increasing progressively from a maximum of about 75° F. to a maximum of about 140° F., and thereafter subjecting the fabric while under mechanical agitation to successive rinsings in water at temperatures decreasing progressively through said range.

2. The process of claim 1 wherein at least one of the rinsings preceding the last rinse is with an aqueous solution of oxalic acid for removing stains of the red clay type and for restoring darkened colors.

3. The process for cleaning fabrics including cotton, comprising subjecting the fabric while under mechanical agitation to the sequential steps of first washing the fabric in water at a temperature not exceeding about 75° F. to remove surface soil, next washing the fabric in an aqueous soap solution at a temperature of about 100° F. to about 120° F., next washing the fabric in an aqueous solution of soap at a temperature from about 120° F. to about 140° F., and thereafter subjecting the fabric to successive rinsings in water at temperatures decreasing progressively through said range.

4. The process of claim 3 wherein the washing at a temperature of about 100° F. to about 120° F. includes a mild bleach, and the washing at a temperature from about 120° F. to about 140° F. includes a stronger bleach.

5. The process for cleaning fabrics including cotton, comprising subjecting the fabric while under mechanical agitation to the sequential steps of first washing the fabric in water at a temperature not exceeding about 75° F. to remove surface soil, next washing the fabric in an aqueous soap solution at a temperature from about 100° F. to about 120° F. for a period of at least about five minutes, next washing the fabric in an aqueous solution of soap at a temperature from about 100° F. to about 120° F. for a period of at least about ten minutes, next washing the fabric in an aqueous solution of soap at a temperature from about 120° F. to about 140° F. for a period

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of at least about twenty minutes, and thereafter subjecting the fabric while under mechanical agitation to successive rinsings in water at temperatures decreasing progressively through said range.

6. For use in the wet cleaning of fabrics, a spotting solution comprising, in parts by weight, about 128 parts water, about 96 parts cleaning solvent, about 24 parts soap, and about 16 parts lubricant.

7. For use in the wet cleaning of fabrics, a spotting solution comprising, in parts by weight, about 128 parts water, about 96 parts cleaning solvent, about 24 parts soap, about 16 parts lubricant, and about 4 parts ammonia.

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6

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18



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Items filed

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**DOCUMENT OF ASSIGNMENT OF PATENT
APPLICATION
ASSIGNMENT**

The Undersigned: Flávio Erasmo Bernardino

Acting as: Inventor

Of: Colombian patent application No. 04 043.958
Entitled: PROCESS FOR REMOVING SPOTS
FROM CLOTHES IN LAUNDRY MACHINES WITH
A VERTICAL SHAFT.

With domicile in: Rua Célio Barbosa da Silva, 415,
13564-060 - São Carlos - SP, BRAZIL

hereby declares that it assigns all rights of
ownership as well as all rights and privileges
relating thereto without exception over the following
application in Colombia:

Of: Colombian patent application No. 04 043.958
Entitled: PROCESS FOR REMOVING SPOTS
FROM CLOTHES IN LAUNDRY MACHINES WITH
A VERTICAL SHAFT.

To: MULTIBRÁS S.A. ELETRODOMÉSTICOS

Domiciled in: Avenida das Nações Unidas, 12.995
- 32º andar 04578-000 - São Paulo - SP, BRAZIL

The assignor and the assignee sign this document
as proof of their acceptance of the assignment.

Given and signed on the 06 of 08 of 2004 day

Signature of assignor

Signature of assignee

Gilberto Mendir de Oliveira Telzeirs EMERSON M. DO VALLE
Diretor Diretor

LEGALIZATION BY COLOMBIAN CONSUL IS
REQUIRED

**DOCUMENTO DE TRASPASO DE SOLICITUD DE
PATENTE
CESION**

El(los) suscrito(s): Flávio Erasmo Bernardino

En calidad de: Inventor

de: Solicitud de patente en Colombia No. 04
043.958
Titulada: PROCESO DE REMOCIÓN DE MANCHAS
DE ROPA EN MAQUINAS LAVADORAS DE EJE
VERTICAL

Con domicilio en: Rua Célio Barbosa da Silva, 415,
13564-060 - São Carlos - SP, BRAZIL

declara por el presente documento que cede todos
los derechos de propiedad que le correspondan, así
como las prerrogativas, sin excepción alguna, sobre
la siguiente solicitud en Colombia:

Solicitud de patente en Colombia No. 04 043.958
Titulada: PROCESO DE REMOCIÓN DE MANCHAS
DE ROPA EN MAQUINAS LAVADORAS DE EJE
VERTICAL

A: MULTIBRÁS S.A. ELETRODOMÉSTICOS

Domiciliado en: Avenida das Nações Unidas, 12.995
- 32º andar 04578-000 - São Paulo - SP, BRAZIL

El cedente y el cesionario firman este documento
como prueba de su aceptación de la cesión.

Dado y firmado a los 06 días del mes de AGOSTO
de 2004.

Firma del cedente

Firma del cesionario

Gilberto Mendir de Oliveira Telzeirs EMERSON M. DO VALLE
Diretor Diretor

LEGALIZACIÓN POR CONSULADO COLOMBIANO ES
REQUERIDA





CERTIFICADO NOTARIAL (SOCIEDAD)

Hoy de de
Personalmente compareció ante mí

a quien conozco, y de quien me consta que firmó el anterior documento, debidamente juramentado declaró y dijo que él es

de: MULTIBRÁS S.A. ELETRODOMÉSTICOS

Sociedad legalmente constituida para un período de duración que aún no ha terminado; que el declarante está autorizado por dicha compañía para conferir esta cesión; que el sello estampado por él al pie de tal cesión, en nombre y representación de la expresada compañía, es el sello oficial de ella; y que el objeto para el cual se confiere este instrumento está comprendido dentro del de la sociedad.

El suscrito Notario hace constar que ha visto las pruebas de la existencia de la sociedad.

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Reconheço Por Semelhança (C/V Econômico) a(s) firma(s) de
GILBERTO MONSIE DE OLIVEIRA TEIXEIRA (149704), EMERSON MARIA
DO VALLE (106749)
São Paulo, 11 de agosto de 2004. Em Teste da Verdade.
PAULO PELLIN - ESCRIVÃO NOTARIAL
SERGIO RICARDO - AUXILIAR - Nº 06377/10804
Válido somente com o Selo de Autenticidade - Valor: R\$7,60

CERTIFICADO NOTARIAL
PERSONA NATURAL

Hoy de de
compareció(aron) ante mí

Flávio Erasmo Bernardino

A quien (se) conozco y me consta que es(son) la(s)
persona(s) firmante(s) del documento que precede y
quien(es) declara(n) que otorgan el mismo para los fines
propósitos que en él se expresan.

FIRMA VALOR

R\$ 7,60

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1.º Tabelão de Notas - Valida José Inácio

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Rio Claro - SP, 11 de agosto de 2004. Em Teste da Verdade.

En Teste da Verdade

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NOTARIAL CERTIFICATE (CORPORATION)

On this day of
Personally appeared before me

to me known, and known to me to be the person who
signed the foregoing instrument who being by me duly
sworn did depose and say that he (she) is the

of: MULTIBRÁS S.A. ELETRODOMÉSTICOS

Which is legally constituted for a term not yet expired,
that deponent is authorized by said Company to confer
this assignment document: that the seal affixed hereunto
by the deponent in the name and on behalf of said
Corporation is the corporate seal thereof; and that the
purpose for which this instrument is granted is included
within the corporate purpose of company.

The undersigned Notary Public attests that he has seen
the documents that prove the existence of the company.

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Under date of

And that he (she) who grants the p
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São Paulo, 11 de agosto de 2004. Em Teste da Verdade.
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NATURAL PERSON

On this day of
Personally appeared before me

Flávio Erasmo Bernardino

Who is(are) known to me and who I attest executed the
foregoing document and he (they) declared he (they)
grant(s) the document for the uses and purposes therein
expressed.

FIRMA VALOR

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Martha La Faurie de Arevalo
MARTHA LAFURIE DE AREVALO
CÓNSUL GENERAL

CONSULADO GENERAL DE COLOMBIA EN SÃO PAULO

N.º 1907

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Martha La Faurie de Arevalo
MARTHA LAFURIE DE AREVALO
CÓNSUL GENERAL

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DOCUMENTO DE TRASPASO DE SOLICITUD DE PATENTE

CESION

EL SUSCRITO: FLAVIO ERASMO BERNARDINO

Actuando en calidad de INVENTOR

DE: Solicitud de Patente en Colombia NO. 04 043 958

Titulada: PROCESO DE REMOCIÓN DE MANCHAS DE ROPA EN MAQUINAS LAVADORAS DE EJE VERTICAL.

Con domicilio en: Rua Célio Barbosa da Silva, 415, 13564-060 - Sao Carlos - SP, BRASIL

Declara por el presente documento que cede todos los derechos de propiedad que le correspondan, así como las prerrogativas, sin excepción alguna, sobre la siguiente solicitud en Colombia:

Titulo: Solicitud de patente en Colombia NO. 04 043.958

Titulada: PROCESO DE REMOCIÓN DE MANCHAS DE ROPA EN MAQUINAS LAVADORAS DE EJE VERTICAL.

A:

MULTIERAS S.A ELECTRODOMESTICOS

Domiciliada en: Avenida das Nações Unidas, 12.995-32° andar 04578-000 Sao Paulo - SP BRASIL

El cedente y el cesionario firman este documento como prueba de su aceptación de la cesión.

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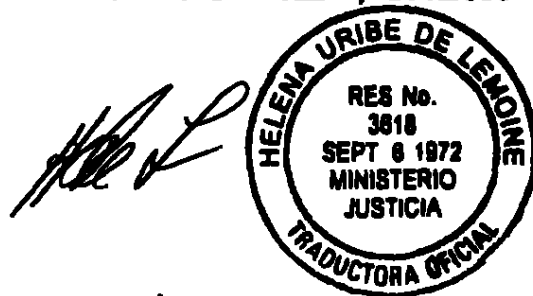
EL CEDENTE:

FIRMADO: FLAVIO ERASMO BERNARDINO

LOS CESIONARIOS:

FIRMADO: GILBERTO MOACIR DE OLIVEIRA TEIXEIRA, DIRECTOR

FIRMADO: EMERSON M. DO VALLE, DIRECTOR.



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(106769). SAO PAULO, 11 DE AGOSTO DE 2004 EN TESTIMONIO DE
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PAULO PELLIM, ESCRIBIENTE AUTORIZADO

SERGIO RICARDO, AUXILIAR

VALIDO SOLAMENTE SI LLEVA EL SELLO DE AUTENTICIDAD.

HAY SELLO NOTARIAL - NO. 0037/110804

[Handwritten signature]



TRADUCCION OFICIAL NO.718/2004-.

CERTIFICADO NOTARIAL (PERSONA NATURAL)

EN LA FECHA COMPARECIO ANTE MI **FLAVIO ERASMO BERNARDINO** A QUIEN CONOZCO PERSONALMENTE Y DE QUIEN ME CONSTA QUE ES LA PERSONA FIRMANTE DEL DOCUMENTO QUE PRECEDE Y QUIEN DECLARO QUE OTORGO EL MISMO PARA LOS FINES Y PROPÓSITOS QUE EN EL SE EXPRESAN.

FIRMADO: ILEGIBLE.

NOTARIA PRIMERA DE RIO CLARO, BRASIL

SE RECONOCE LA SIMILITUD DE LA FIRMA DE **FLAVIO ERASMO BERNARDINO**, DE LO CUAL DOY FE.

RIO CLARO, 6 DE AGOSTO DE 2004. EN TESTIMONIO DE LO ANTERIOR, FIRMAMOS EL PRESENTE DOCUMENTO:

THAIANA GULLO VARUZZA, ESCRIBIENTE AUTORIZADA

VALIDO SOLAMENTE SI LLEVA EL SELLO DE AUTENTICIDAD.



138
134

CONSULADO GENERAL DE COLOMBIA

SIGUE AUTENTICACIÓN DE LA FIRMA DE PAULO PELLIM,
ESCRIBIENTE AUTORIZADO DE LA NOTARIA DECIMO TERCERA DE SAO
PAULO, BRASIL, EFECTUADA POR EL CONSULADO GENERAL DE
COLOMBIA EN SAO PAULO, BRASIL, BAJO EL NO. 1906 DEL 16 DE
AGOSTO DE 2004.

FIRMADO: MARHTA LAFAURIE DE AREVALO, CÓNsul GENERAL.

HAY SELLO DEL CONSULADO GENERAL DE COLOMBIA EN SAO PAULO.

SIGUE AUTENTICACIÓN DE LA FIRMA DE THAIANA GULLO VARUZZA,
ESCRIBIENTE AUTORIZADA DE LA NOTARIA PRIMERA DE RIO CLARO,
BRASIL, EFECTUADA POR EL CONSULADO GENERAL DE COLOMBIA EN
SAO PAULO, BRASIL, BAJO EL NO. 1907 DEL 16 DE AGOSTO DE
2004.

FIRMADO: MARHTA LAFAURIE DE AREVALO, CÓNsul GENERAL.

HAY SELLO DEL CONSULADO GENERAL DE COLOMBIA EN SAO PAULO.

MINISTERIO DE RELACIONES EXTERIORES DE COLOMBIA

SIGUE AUTENTICACIÓN DE LA FIRMA DE MARTHA LAFAURIE DE
AREVALO EFECTUADA POR EL MINISTERIO DE RELACIONES
EXTERIORES EN BOGOTA BAJO EL NO. 059230 DEL 26 DE AGOSTO DE
2004. FIRMADO: ILEGIBLE, JEFE DE LEGALIZACIONES.

HAY SELLO DEL MINISTERIO.

LA TRADUCTORA OFICIAL

HELENA URIBE DE LEMOINE



2020
Bogotá D C

Doctor(a)
RAMIRO CASTRO DUQUE.
Apoderado(a)

REFERENCIA:	Radicación N°	04-43958
	Solicitud internacional	PCT/BR02/00150
	Fecha límite de inicio en fase nacional	13/06/2004
	Trámite	011
	Evento	379
	Actuación	416
	Oficio N°	825
	Folios	001

Teniendo en cuenta que la solicitud de privilegio de patente que se tramita bajo el expediente indicado en el asunto, reúne los requisitos de forma establecidos en los artículos 26 y 27 de la Decisión 486, de la Comisión de la Comunidad Andina, el Tratado de Cooperación en Materia de Patentes (PCT), el Reglamento y la Circular Única de la Superintendencia de Industria y comercio, se envía el extracto de la solicitud a la oficina de comunicaciones para efecto de su publicación en la Gaceta de Propiedad Industrial, conforme lo dispone el artículo 40 de la referida Decisión 486.

Cúmplase

Dado en Bogotá D C, **20 SET. 2005**


ALIX CARMENZA CESPEDES DE VERGEL
Jefe División de Nuevas Creaciones.

202028

Al contestar favor indique el número de radicación consignado en el sticker

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