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(11) **EP 0 849 391 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.06.1998 Bulletin 1998/26

(51) Int. Cl.⁶: **D06F 39/02**

(21) Application number: **96203321.3**

(22) Date of filing: **26.11.1996**

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**
Designated Extension States:
AL LT LV SI

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(54) **Process for mixing a detergent and solubilizer and system therefor**

(57) The invention relates to a process for mixing a detergent and a solubilizer in a mixing system, comprising the steps of:

- feeding the detergent through a detergent feed line (4) into the system;
- feeding the solubilizer through a solubilizer feed line (12) into the system;

- mixing the detergent and solubilizer together at a junction of the feed lines,
- directing the detergent/solubilizer mixture into a separate mixing chamber (6) of the system, wherein further mixing takes place and,
- shutting off the detergent feed whilst the solubilizer is continually fed into the system.

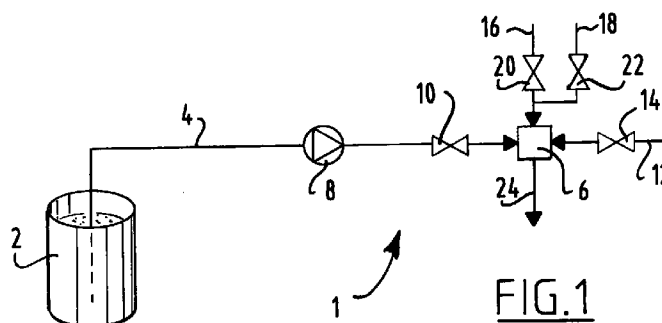


FIG.1

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Description

Field of the invention

The present invention relates to a process and system for mixing a detergent and solubilizer together.

Background of the invention

Mixing together of detergent concentrates, especially those with a highly viscous paste-like consistency, with a solubilizer such as water in order to yield a fluid detergent, is usually carried out in the mixing chamber of a delivery system.

A machine washing process and a dosing system wherein a paste-form detergent is taken from a storage container and delivered to a mixing unit and therein diluted with water is proposed in EP 0 295 525 (Henkel Kommanditgesellschaft auf Aktien).

A problem here is that a residue of the detergent concentrate is often left behind in the feed lines and mixing chamber of the delivery system, which residue can harden and subsequently cause blockages.

In order to remove these blockages and to clean the system, dismantling thereof is necessitated.

Object of the invention

It is an object of the present invention to provide an improved process for mixing together detergents and solubilizers, in order to combat the above problems.

Description of the invention

The present invention provides a process for mixing a detergent and a solubilizer in a mixing system, comprising the steps of:

- feeding the detergent through a detergent feed line into the system;
- feeding the solubilizer through a solubilizer feed line into the system;
- mixing the detergent and solubilizer together at a junction of the feed lines,
- directing the detergent/solubilizer mixture into a separate mixing chamber of the system and,
- shutting off the detergent feed line whilst the solubilizer is continually fed into the system, whereby the system is cleaned of detergent residue.

Since the solubilizer is continually fed into the system after the detergent feed has been shut off, the solubilizer feed cleans the system and removes detergent residue adhering thereto so that the latter is effectively cleaned and blockages are prevented.

Mixing of the detergent and solubilizer substantially occurs at the junction of the detergent feed line and the solubilizer feed line whereby the detergent is substan-

tially solubilized before entry into the mixing chamber. Accordingly the chances of any detergent adhering thereto which could lead to the above problems are reduced.

The solubilizer is preferably ejected from the solubilizer feed line with a pressure greater than that in the feed line, in order to yield good mixing and cleaning conditions.

A second solubilizer feed is preferably fed directly into the mixing chamber. This second solubilizer feed line is preferably continued after the first solubilizer feed line has been shut off, whereby a good functioning of the system is effected.

Compressed air can be fed into the mixing chamber feed, and is preferably continually fed into the mixing chamber after the second solubilizer feed line has been shut off. Accordingly, good mixing and pressure conditions for delivery of the detergent mixture are obtained.

The detergent mixture can subsequently be fed into a washing machine via a detergent exit line.

The detergent can be substantially non-aqueous and preferably has a non-aqueous phase and a substantially solid phase. Furthermore the detergent can comprise non-ionic surfactant materials, sequestering agents, and other detergent ingredients. The particle size of the solid phase can be smaller than 50 μ m, preferably less than 40 μ m.

Moreover the detergent can have a Brookfield viscosity in the range of 1-1000 Pa.s., preferably in the range of 30-300 Pa.s. and most preferably in the range of 1-4 Pa.s.. Detergents with such qualities are effective paste-like detergents.

Further aspects of the present invention relate to a system for carrying out the above process and to the use of said system therefor.

Specific description of the invention

The present invention will now be described by way of the following description which refers to the figures, wherein:

Figure 1 schematically shows the system and the various feed lines associated therewith,

Figure 2 shows a cross-section through part of the system from figure 1.

The system 1 (figure 1) according to the present invention has a detergent reservoir 2, connected to a detergent feed line 4 which leads into a mixing chamber 6. A pump 8 is associated with the line 4 in order to pump detergent along line 4 from the detergent reservoir 2. A valve 10 is also associated with feed line 4, to open and shut off the feed line 4.

An unbroken water feed line 12 leads through mixing chamber 6 opposite to the detergent feed line 4 and, as shown in figure 2, is continuous therewith. A valve 14 is associated with water feed line 12 to open and shut off

the water feed line. A second water feed line 16 leads into the mixing chamber 6, and a compressed air line 18 is joined with this water feed line 16.

Valves 20 and 22 are respectively associated with the water feed line 16 and compressed air line 18, to open and shut off respectively the water feed line 16 and the air feed line 18.

A delivery line 24 delivers the detergent mixture from the mixing chamber 6 into a washing machine (not shown).

The water feed line 12 joins the detergent feed line 4 (see figure 2) at a junction 26. A narrowing element 28, for example a nut, is associated with the water feed line 12 at the junction 26 in order to increase the water velocity through line 12 into the detergent feed line 4. Openings 30 are arranged by the junction 26 in the detergent feed line 4 on opposite sides thereof. Two channels 32 extend from the mixing chamber 6 to connect with the openings 30.

A narrowing element 36 is associated with the second water feed line 16 in order to prevent that the water pressure in channel 12 is insufficient to allow for a good mixing.

In use, detergent is pumped via pump 8 from the reservoir 2 through the feed line 4 and open valve 10 to contact and mix with the water, at the junction 26. At this point valves 14 and 20 are open whilst valve 22 is shut.

Due to the narrower internal open diameter of the narrowing element 28, the water is forced through the junction 26 with a higher velocity than before the narrowing element to increase the mixing effect at the junction 26, whereby the detergent mixture is forced out of the openings 30 and through the channels 32 into the mixing chamber 6.

In a preferred embodiment of the system according to the present invention, the internal diameter of the water feed line 12 is 6 mm, the internal diameter of the detergent feed line 4 is 4 mm, and the internal open diameter of the nut 28 is 2.5 mm.

Valve 10 is subsequently closed in order to shut off the detergent feed line 4.

Water is continually fed through line 12 and the junction 26 in order to be directed against the now closed valve 10, whereby said valve 10 is cleaned of detergent adhering thereto, whereafter this is fed via openings 30 and channels 32 into the mixing chamber 6.

Valve 14 is subsequently shut off.

At this point the detergent mixture is situated in the mixing chamber 6 whereby water is continually fed therein through line 16.

Valve 20 is subsequently closed in order to shut off the water supply via line 20 into the mixing chamber 6.

Valve 22 is subsequently opened to allow compressed air to flow through line 16 into the mixing chamber 6 in order to force the detergent mixture therein through the delivery feed line 24 and to further aid in cleaning the mixing chamber 6.

The process and system according to the current invention are of particular use in mixing water and highly viscous detergent concentrates, for example in the form of pastes, together in order to yield a fluid detergent mixture.

Examples of a detergent formulation which can be mixed in the system according to the present invention are to be found in the European patent application number 0 158 464 and the European patents numbers 0 356 707 and 0 030 096.

Claims

1. Process for mixing a detergent and a solubilizer in a mixing system, comprising the steps of:
 - feeding the detergent through a detergent feed line into the system;
 - feeding the solubilizer through a solubilizer feed line into the system;
 - mixing the detergent and solubilizer together at a junction of the feed lines,
 - directing the detergent/solubilizer mixture into a separate mixing chamber of the system, wherein further mixing takes place and,
 - shutting off the detergent feed whilst the solubilizer is continually fed into the system.
2. Process according to claim 1 wherein the solubilizer is ejected at a higher velocity from the junction than in the solubilizer feed line.
3. Process according to claims 1 or 2, wherein a second solubilizer feed is fed through a second solubilizer feed line into the mixing chamber.
4. Process according to claim 3, wherein the second solubilizer feed is fed into the mixing chamber after the first solubilizer feed line has been shut off.
5. Process according to any of the preceding claims, wherein compressed air is fed into the mixing chamber.
6. Process according to claim 5, wherein the compressed air is fed into the mixing chamber after the second feed of solubilizer has been shut off.
7. Process according to any of the preceding claims, wherein the detergent/solubilizer mixture is fed from the mixing chamber to a washing machine.
8. Process according to any of the previous claims for mixing together a solubilizer, preferably water, with a substantially non-aqueous, high-viscosity detergent.
9. Process according to claim 8 wherein the detergent

has a Brookfield viscosity in the range of 1-1000 Pa.s., preferably in the range of 30-300 Pa.s. and most preferably in the range of 1-4 Pa.s..

10. System for carrying out the process according to any of the claims 1-9, comprising:
 - a detergent feed line for feeding detergent into the system,
 - a solubilizer feed line for feeding solubilizer into the system,
 - a mixing junction formed by the convergence of these feed lines, whereat the solubilizer and detergent are mixable to form solubilizer/detergent mixture, and
 - a mixing chamber, distanced from the feed-lines' junction, wherein the solubilizer/detergent mixture is further mixable.
11. System according to claim 10, wherein the junction of the solubilizer feed line and detergent feed line is exterior to the mixing chamber.
12. System according to claims 10 or 11 further comprising velocity increasing means for increasing the velocity of the solubilizer exiting the junction.
13. System according to claims 10-12 further comprising a second solubilizer feed line for feeding solubilizer into the mixing chamber.
14. System according to any of the claims 10-13 further comprising a compressed air feed line for feeding compressed air into the mixing chamber.
15. System according to any of the claims 10-14, further comprising a detergent/solubilizer mixture feed line for feeding thereof into a washing machine.
16. System according to any of the claims 10-15, wherein one or more valves are arranged within one or more of the feed lines in order to shut the feed off within these lines.
17. System according to any of the claims 10-16, wherein the first detergent feed line exits into the first solubilizer feed line.
18. System according to claim 17, wherein a channel is disposed between the mixing chamber and the junction of the solubilizer line with the detergent feed line.
19. System according to claim 18, wherein the junction is narrower than the solubilizer feed line.
20. System according to claim 19, wherein the second solubilizer feed line opens directly into the mixing

chamber.

21. System according to claim 19 wherein the opening of the second solubilizer feed line is narrower than the second solubilizer feed line.
22. System according to claim 21 wherein the compressed air feed line is connected to the second solubilizer feed line.
23. System according to any of the claims 10-22 further comprising a pump for pumping detergent through the system.
24. Use of a system according to any of the claims 10-23, for carrying out the process according to any of the claims 1-9.

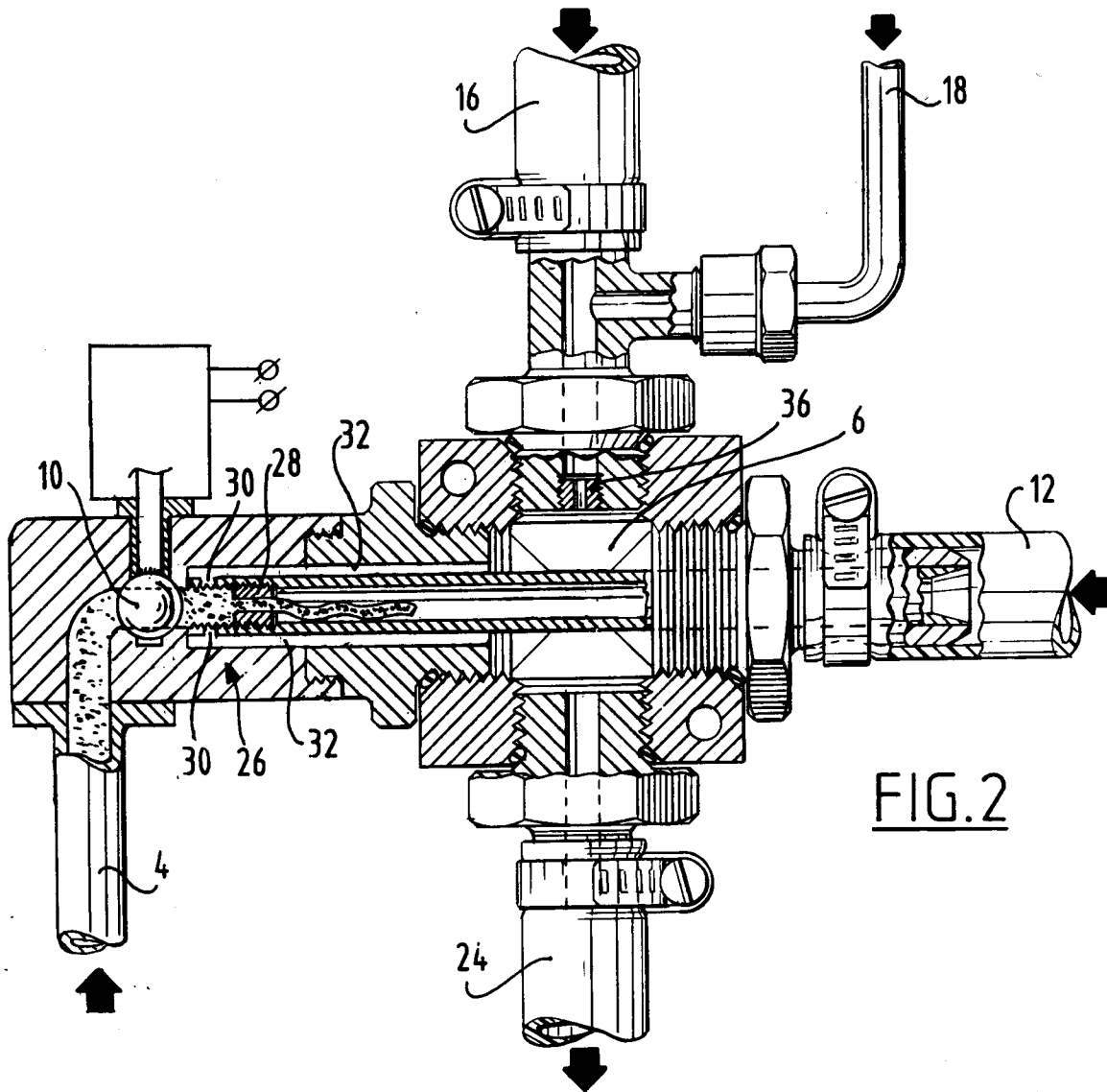


FIG. 2

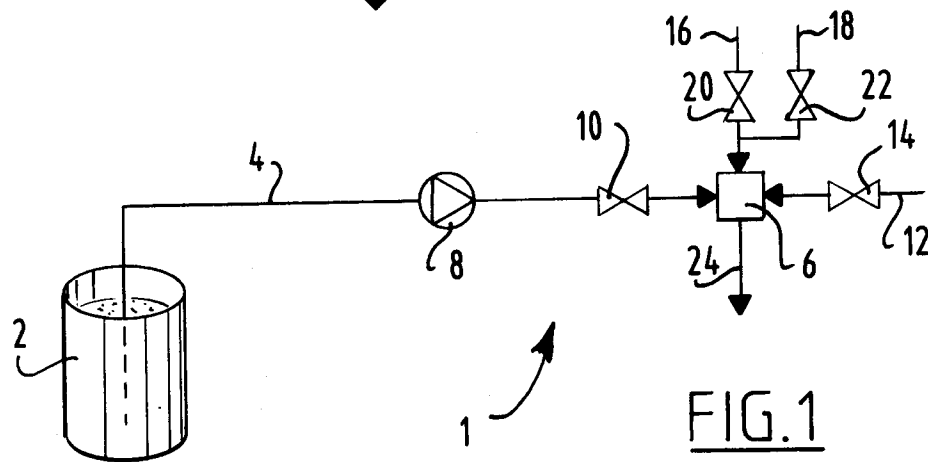


FIG. 1



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EUROPEAN SEARCH REPORT

Application Number
EP 96 20 3321

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.6)
A,D	EP 0 295 525 A (HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN) * column 10, line 50 - column 11, line 34 * * column 13, line 45 - line 57; figures 1,7 *	1,7-10, 15	D06F39/02
A	--- US 4 090 475 A (S.E. RYKOFF & CO.) * column 5, line 68 - column 6, line 12; claim 1; figure *	1,10,15, 16,23	
A	--- GB 2 168 726 A (UNILEVER PLC) * the whole document *	1,10	
A	--- EP 0 480 490 A (UNILEVER NV) * abstract; figure * -----	5,14	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			D06F A47L
Place of search	Date of completion of the search	Examiner	
THE HAGUE	13 May 1997	Courrier, G	
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>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 & : member of the same patent family, corresponding document</p>			

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