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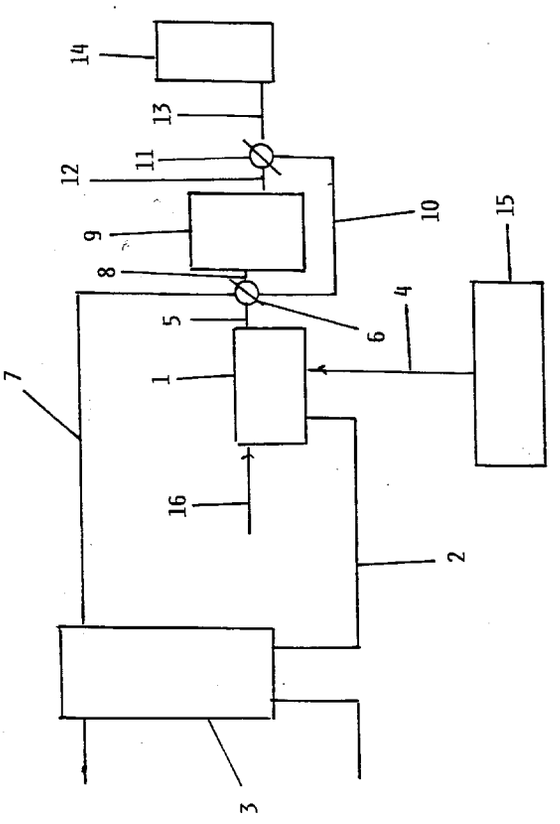
(54) Process and plant for degreasing mechanical parts.

(57) A process for degreasing mechanical parts, characterised by :
— placing the parts to be degreased in a sealed chamber (1) and then creating vacuum in the chamber interior,
— introducing into the chamber (1) a solvent in vapour form,
— introducing into the chamber (1) the solvent in liquid form,
— feeding the liquid solvent to a storage tank (3),
— feeding into the chamber (1) further solvent in vapour form,
— creating vacuum in the chamber interior in order to evaporate the solvent,
— exhausting the gaseous solvent from the chamber,
— introducing air into the chamber interior.



EP 0 581 113 A1

This invention relates to a process for degreasing mechanical parts and a plant for implementing the process.

Processes for degreasing and washing mechanical parts using chlorinated or non-chlorinated solvents are known.

One of these known processes uses a boiler containing the solvent, a grid on which the objects to be degreased are rested, this being positioned a certain distance above the surface of the solvent, and, positioned above the grid, a condenser formed from pipes through which water passes. On heating the boiler, the solvent vapour which is generated condenses on the objects deposited on the grid, to degrease them. At the end of the operation they remain wetted with pure solvent because this reaches them always in a distilled state.

The degreasing plant is usually completed by a device for recovering the solvent vapour from the air used for drying the degreased parts.

This known process has however certain drawbacks, and in particular:

- high pollution of the working environment and the external environment due to the large quantity of solvent retained by the surfaces of the parts to be degreased;
- a high plant operating cost arising from the use of electrical or thermal energy and the consumption of solvent;
- ineffective degreasing of the parts, especially if comprising internal cavities (tubes and fins).

An object of the invention is to obviate these drawbacks by providing a degreasing process which does not result in environmental pollution.

A further object of the invention is to provide a process of low operating cost.

These and further objects which will be apparent from the description given hereinafter are attained according to the invention by a process for degreasing mechanical parts as described in claim 1.

The process according to the invention is implemented by a plant as described in claim 4.

A preferred embodiment of the present invention is described in detail hereinafter with reference to the accompanying drawing, which represents a schematic view of a plant for implementing the process according to the invention.

As can be seen from the figure, the process according to the invention uses a plant comprising a sealed chamber 1 to which the following are connected:

- an inlet line 2 for the liquid solvent, in particular perchloroethylene, originating from a storage tank 3,
- an inlet line 4 for solvent vapour originating from a boiler 15,
- an outlet line 5 connected to a condenser 6 from which there extend a return line 7 to the tank 3, a line 8 connected to a vacuum pump 9, and a line 10 leading to a further condenser 11,
- a line 16 for feeding environmental air.

The condenser 11 is connected to the vacuum pump 9 by a line 12 and to an activated carbon filter 14 by a line 13. The perchloroethylene storage tank is also connected to a distillation unit, not shown on the drawing.

The plant also comprises a plurality of valves and control devices, which fall within the normal knowledge of the skilled man and are not shown for simplicity of description.

The plant for implementing the process of the invention operates as follows:
the parts to be cleaned are placed in the chamber 1 which is then closed.

Then after creating vacuum by the pump 9, solvent vapour is fed into the chamber through the line 4 to condense on the parts and penetrate into their interstices by virtue of the degree of vacuum.

Solvent in the liquid state is then fed in through the line 2 from the storage tank 3. During this stage the parts are rinsed and any dirt still adhering to them is removed.

All the solvent is discharged through the line 7 to return to the storage tank 3, from which it is fed to the distillation unit.

Solvent vapour is then again fed into the chamber 1, to condense on the parts and dissolve the final dirt.

Vacuum is then again created in the interior of the chamber 1 by the pump 9 in order to totally evaporate the solvent, which is fed to the condenser 11 operating at low temperature.

When the solvent has been removed, environmental air is fed in through the line 16, this air being drawn through by the pump 9 and fed to the activated carbon filter 14, which retains odour and any solvent traces.

From the aforegoing it is apparent that the process of the invention has numerous advantages and in particular:

- a saving in operating cost because of the lower solvent and electrical and thermal energy consumption,
- a greater degreasing effect because of the facility for the solvent to diffuse into the interior of the parts,
- a non-polluted environment because no solvent diffuses into the environment.

Claims

1. A process for degreasing mechanical parts, characterised by:
   - placing the parts to be degreased in a sealed chamber (1) and then creating va-

cuum in the chamber interior,
- introducing into the chamber (1) a solvent in vapour form,
- introducing into the chamber (1) the solvent in liquid form,
- feeding the liquid solvent to a storage tank (3),
- feeding into the chamber (1) further solvent in vapour form,
- creating vacuum in the chamber interior in order to evaporate the solvent,
- exhausting the gaseous solvent from the chamber,
- introducing air into the chamber interior.

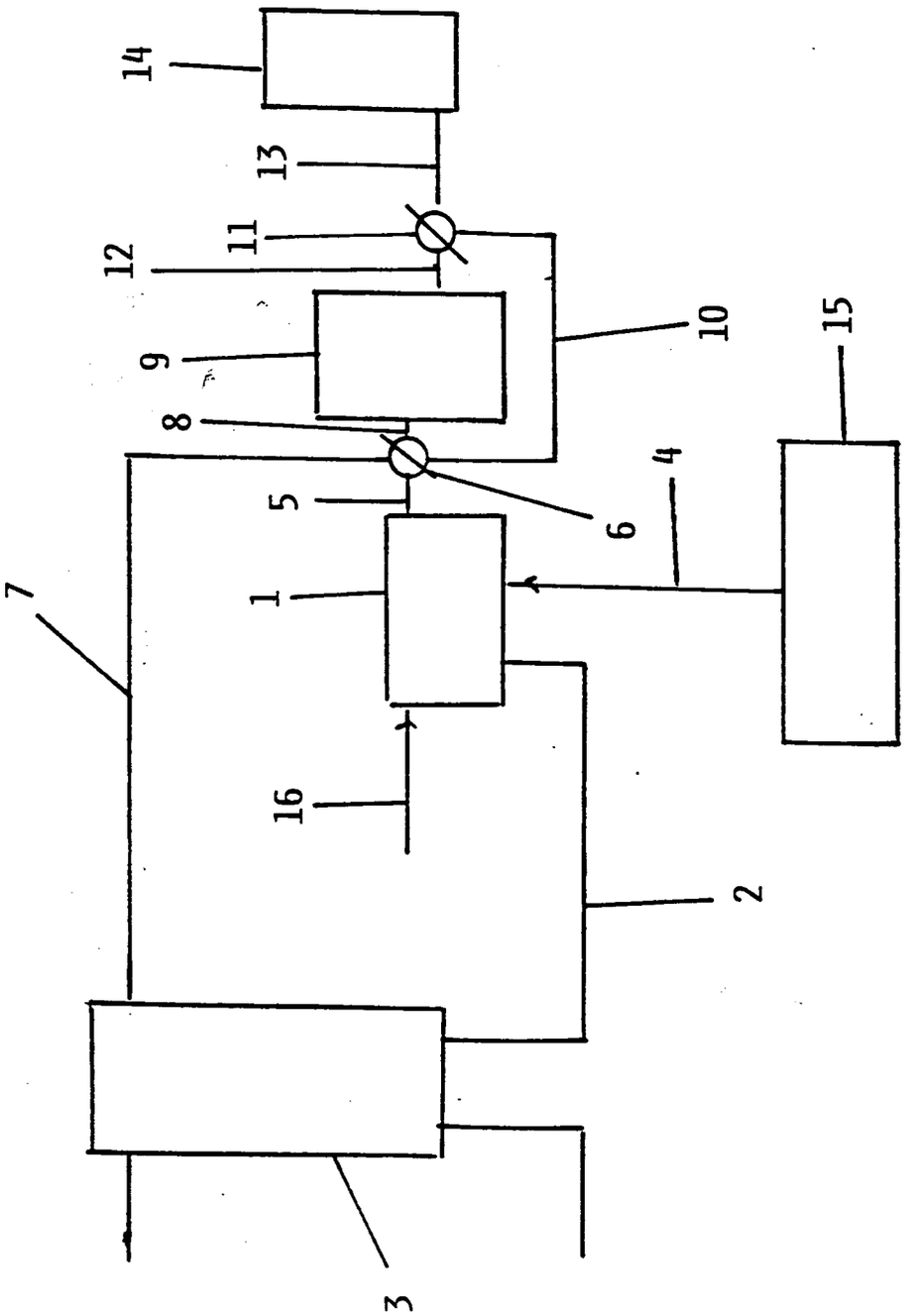
2. A process as claimed in claim 1, characterised in that the air fed into the chamber is then passed through an activated carbon filter (14).

3. A process as claimed in claim 1, characterised in that the liquid solvent leaving the storage tank is distilled before being again fed to the sealed chamber.

4. A plant for implementing the process in accordance with claim 1, characterised by comprising:
   - a sealed chamber (1) containing the parts to be degreased,
   - a storage tank (3) for feeding liquid solvent to the sealed chamber,
   - a boiler (15) for feeding gaseous solvent to the sealed chamber (1),
   - a pump (9) for creating vacuum in the interior of the sealed chamber.

5. A plant as claimed in claim 3, characterised by also comprising an activated carbon filter (14) for filtering the air leaving the sealed chamber.

6. A plant as claimed in claim 4, characterised by comprising a condenser (11) for condensing the vapour drawn from the chamber when under vacuum.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EUROPEAN SEARCH REPORT

Application Number
EP 93 11 1270

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.5)
X	EP-A-0 381 887 (TIYODA SEISAKUSHO K. K.) * column 6, line 34 - column 9, line 13; figures 1,2 *	4-6	C23G5/04 C23G5/02
Y	* column 6, line 34 - column 9, line 13; figures 1,2 *	1-3	
Y	FR-A-2 098 576 (THE DOW CHEMICAL COMPANY) * page 5, line 3 - page 5, line 36 *	1-3	
X	DE-C-347 425 (NEUMEYER F.) * page 2, line 14 - page 2, line 70; figure 1 *	4,6	
X	GB-A-1 135 181 (EYLES I. F.) * claims 1,6-10 *	4,6	
A	EP-A-0 276 876 (METALAS-HOLLAND B.V.)		
A	EP-A-0 289 982 (HÖCK METALL-REINIGUNGS-ANLAGEN GMBH)		
A	EP-A-0 392 758 (JAPAN FIELD COMPANY)		
A	DE-A-38 23 322 (CARL DITTMANN GMBH)		

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

C23G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 November 1993	TORFS, F

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 : non-written disclosure
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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
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