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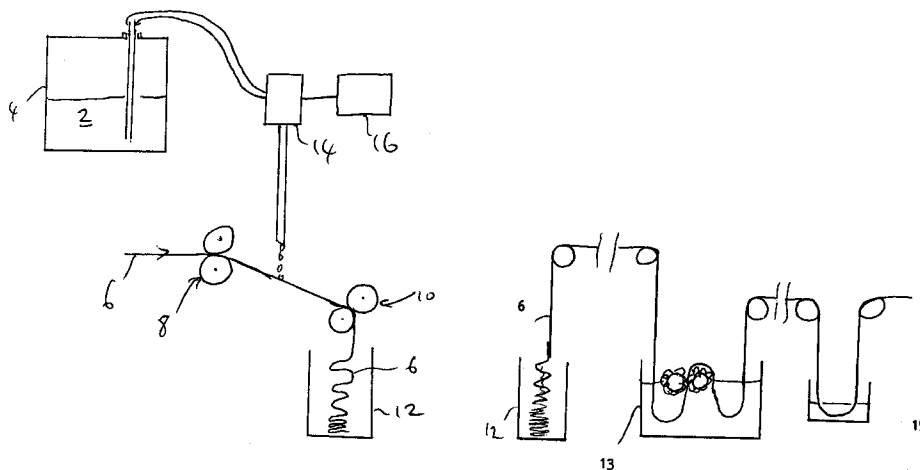
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(54) A method of cleaning a zip fastener

(57) A method of cleaning a zip fastener (6), in which a cleaning solution (2) is applied to the fastener (6) during the manufacturing process, is left on the fas-

tener (6) for a period of time, and is then rinsed, prior to finishing.



EP 0 931 473 A2

Description

[0001] The present invention relates to the cleaning of zip fasteners during the manufacturing process.

[0002] Zip fasteners are generally manufactured by fitting zip elements onto a stringer tape. Typically, metallic zip elements of, for example, aluminium are fitted onto a stringer tape of a flexible material such as polyester, and finished by dipping in paraffin. During the manufacturing process, the fasteners pick up dirt in the form of oil or grease stains, as well as metallic dirt particles. This is particularly the case where the machine for forming the elements and fitting them to the stringer tape must be lubricated with oil.

[0003] It is therefore important to clean the zip fasteners to remove dirt stains and particles from the stringer tape, particularly if the zip fasteners have light coloured stringer tape. To this end, finished zip fasteners in the past have had to be subjected to a separate cleaning treatment after the manufacturing process, that is after finishing, for example by high pressure spraying with a solvent.

[0004] Furthermore, the cleaning treatments used in the past have not proved entirely satisfactory in removing oil and/or grease stains as well as metallic dirt from the zip fastener tape. Therefore, a need exists for a more economical and effective way of producing clean, finished zip fasteners.

[0005] Accordingly, the present invention provides a method of cleaning a zip fastener, in which a cleaning solution is applied to the fastener during the manufacturing process, is left on the fastener for a period of time, and is then rinsed, prior to finishing.

[0006] The cleaning solution may be applied to the fastener by any suitable method, for example by dripping or spraying, or by immersing the fastener in the bulk cleaning solution. Preferably the solution is dripped onto the tape, which is then left to stand for a period of time, before rinsing.

[0007] The cleaning solution contains a suitable surface active agent for removing oil and grease from the tape, preferably an anionic surface active agent, particularly preferably the surface active agent IMEROL RS (pH 8.5) available from Clarion S.A. of Spain, and furthermore contains an agent for attacking metallic dirt particles on the tape, preferably an acid such as sulphuric acid or an alkali such as sodium hydroxide, more preferably a weak acid such as oxalic acid.

[0008] The concentration and pH of the cleaning solution are such that when the solution is applied to and left on the zip fasteners for a predetermined period of time before rinsing, the tape is effectively cleaned of dirt without burning or discolouring. The surfactant such as IMEROL RS may be used in the cleaning solution at a concentration of from 30ml to 100ml, preferably 60ml, per 20 litres of solution.

[0009] A particularly preferred cleaning solution contains Imerol RS and an acid at a solution pH value of from 2 to 5, most preferably oxalic acid at a solution pH value of from 3.5 to 4.5.

[0010] Preferably the tape is left to stand for at least about 10 minutes, and more preferably for about 20 minutes to one hour.

[0011] After rinsing off the cleaning solution with water, the tape is dried and a thin coating of paraffin is applied to lubricate and finish the fastener, as is well known in the art.

[0012] The invention will be further described by way of example with reference to the accompanying drawing, which illustrates the process of the invention.

[0013] In the drawing a cleaning solution 2 in accordance with the invention is held in a container 4. The solution 2 comprises about 5ml of IMEROL RS and at least 0.5ml of sodium hydroxide per litre.

[0014] A zip fastener chain 6 is fed between inlet rollers 8 and outlet rollers 10 at a rate of about 4.3 meters per minute to a holding bin 12. The solution 2 is dripped onto the chain by a metering pump 14 controlled by a microprocessor 16. The drip rate is about 25ml per minute. The feeding rate of the chain and drip rate of solution may be varied so as to deposit about 6ml of solution per meter of chain.

[0015] The wetted chain is fed to the holding bin 12, where it is held for about 30 minutes.

[0016] After "soaking" in the cleaning solution, the chain 6 is fed through a brushing and rinsing station 13 at a rate of about 25 meters per minute where it is rinsed with water, and is then passed through a vacuum drying station (not shown) operating at a temperature of about 120°C, over a period of about 5 seconds, and dipped in a paraffin bath 15. The speed of chain through the rinsing and drying solutions can be varied as necessary.

Example 1

[0017] Zip fastener chains produced on a machine, by fitting aluminium zip elements onto light coloured polyester tape, were treated with different cleaning solutions by immersion, and the degree of cleanliness of the tapes was evaluated after rinsing and drying. Each result was based on the average evaluation of two samples, treated respectively for 20 and 30 minutes. The results are shown in Table I.

Example 2

[0018] Zip fastener chains were treated with the cleaning solutions used in samples 3,5 and 10 of Example 1 and left to stand for different periods of time, ranging from 1 minute to 375 minutes, before rinsing and drying. Cleanliness of the tapes was evaluated as shown by the results in Table II.

No	H ₂ O _(L)	NaOH _(ml)	H ₂ SO _{4(ml)}	C ₂ O ₄ H ₂ H ₂ O _(g/20l)	Imerol (ml)	pH	Results
1	19.93	2			60	13	X
2	19.9	40			60	13.5	Δ
3	19.8	60			60	13.5	O
4	19.7	80			60	13.5	X
5	19.69		250		60	2	O
6	19.87		62.5		60	2	Δ
7	19.44		500		60	1.5	X
8	19.8		125		60	2	Δ
9	19.9			4	60	4.5	Δ
10	19.9			8	60	4	◇
11	19.9			16	60	3.5	O

Initial Concentrations

◇	Very Good	NaOH	30%
O	Good	H ₂ SO ₄	98%
Δ	Average	C ₂ O ₄ H ₂ H ₂ O	60%
X	Bad		

**Time in cleaning solution
before rinsing (minutes)**

		1	5	10	20	30	60	90	120	345	375
NaOH 60ml		X	X	X	Δ	O	Δ	X	X	X	X
IMEROL 60 ml											
H ₂ SO ₄ 250 ml		X	Δ	Δ	Δ	O	O	X	X	Δ	Δ
IMEROL 60 ml											
C ₂ O ₄ H ₂ 8g		X	X	Δ	O	◇	◇	O	O	Δ	X
IMEROL 60 ml											

Claims

1. A method of cleaning a zip fastener, in which a cleaning solution is applied to the fastener during the manufacturing process, is left on the fastener for a period of time, and is then rinsed, prior to finishing of the zip fastener.

2. A method as claimed in claim 1, wherein the cleaning solution contains a surface active agent and an acid or alkali.

3. A method as claimed in claim 2, wherein the surface active agent is an anionic surface active agent.

4. A method as claimed in claim 1 or 2, wherein the surface active agent is IMEROL RS.

5. A method as claimed in claim 2, 3 or 4, wherein the alkali is sodium hydroxide.

5. A method as claimed in claim 2 or 3, wherein the acid is selected from sulphuric acid and oxalic acid, in an amount to provide a solution pH of from 2 to 5.

6. A method as claimed in claim 5, wherein the acid is oxalic acid in an amount to provide a solution pH of from 3.5 to 4.5.

7. A method as claimed in any of claims 1 to 6, wherein the cleaning solution is left on the fastener for about 20 minutes to one hour, before rinsing.

