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Process and machine for peening the surface of fabrics.

(57)

The machine for peening the surface of fabrics has a grit-blasting chamber (3), a belt (6) for moving the fabric (5) to be treated through the grit-blasting chamber (3), and a centrifugal turbine (16) arranged in the grit-blasting chamber (3) and fed with grit. The centrifugal turbine (16) is arranged so that its ejection outlet faces the fabric (5) to be treated in order to eject the grit onto the side of the fabric (5) which is to be subjected to the treatment so as to obtain particular finishing effects.

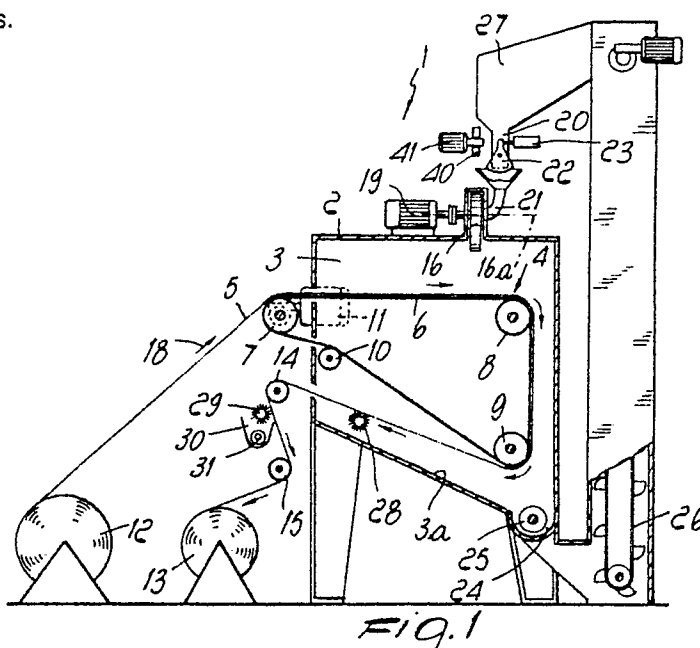


Fig. 1

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EP 0 350 753 A1

PROCESS AND MACHINE FOR PEENING THE SURFACE OF FABRICS

The present invention relates to a process and machine for peening the surface of fabrics.

As known, the term "fabric finishing" defines the operations and chemical treatments to which the yarns or fabrics are subjected in order to improve their appearance and characteristics.

The textile products market currently has increasingly exacting requirements which assign great importance to the aesthetic appearance of the fabric and which cannot be met by normal chemical finishings.

Increasingly sophisticated nuances and aesthetic aspects are required in the particular field of fabrics intended for dress-making, both in fashion-wear with elegant creations and in sportswear and leisure-wear.

The field of fabrics for interior decoration also requires aesthetic innovations, and so does the field of fabrics intended for the manufacturing industry of footwear, bags, etc.

In order to meet these requirements, new kinds of mechanical finishing have been implemented which perform particular processes, such as the teaseling or the fluffing of the fabrics, which however have some disadvantages, such as the scarcity of production due to the low processing speeds required to avoid the overheating or tearing of the fabric, or the disadvantage of decreasing the fabric's mechanical resistance since the action produced by such processes superficially cuts the fibers which compose the fabric, consequently removing material.

Fabric sand-blasting treatments are also known which substantially consist in striking the fabric with jets of sand ejected by nozzles fed by compressed-air sand-blasters. This treatment has several disadvantages, since the nozzles produce a concentrated ejection, causing discontinuities and streaks on the surface of the fabric, producing uneven aesthetic effects.

Compressed-air sand-blasting furthermore has the disadvantage of yielding low productivity and of using a considerable amount of energy.

The aim of the present invention is to obviate the above described disadvantages by providing a process and a machine for peening the surface of fabrics which ensures an excellent aesthetic effect without however significantly reducing the mechanical resistance of the fabric.

Within the scope of the above described aim, an object of the invention is to provide a machine for the treatment of fabrics which has high productivity with modest energy consumption.

Another object of the invention is to provide a machine which provides a uniform treatment of the

fabric subjected to the treatment.

A further object of the invention is to provide a process which can create particular finishing effects on the surface of fabrics, such as for example the effect of making them dull, of giving the fabric the appearance of wear due to use combined with the tactile effect of peach-skin, or the particular velvet-like effect of chamois leather and other aesthetic effects which are difficult to obtain with conventional chemical or mechanical treatments.

This aim, these objects and others which will become apparent hereinafter are achieved by a process for peening the surface of fabrics, characterized in that it consists of a mechanical action of bombarding the fabric with grit.

In order to perform the process according to the invention, a machine is preferably used which is characterized in that it comprises: a grit-blasting chamber, means for advancing fabric to be treated through said grit-blasting chamber, and a centrifugal turbine arranged in said grit-blasting chamber and fed with grit, said centrifugal turbine being arranged so that its ejection outlet faces the side of the fabric to be treated.

Further characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of the machine for performing the process according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic and partially cut-away lateral elevation view of the machine according to the invention; and

figure 2 is a partially sectional front elevation view of the machine.

With reference to the above described figures, the machine according to the invention, generally indicated by the reference numeral 1, comprises a casing 2 which internally defines a grit-blasting chamber 3 in which the fabric 5 to be treated is progressively advanced by traction means 4.

Said traction means 4 are preferably constituted by a belt 6 made of elastically flexible material, such as for example rubber, which extends along a closed path and winds around rollers 7, 8, 9 and 10. An upper portion of said path extends on a substantially horizontal plane, and at least one of said rollers, the roller 7 in the illustrated case, is actuated so as to rotate about its axis by means of a known motor reducer 11 with variable rotation speed.

The fabric 5 to be treated, wound on a reel 12, is placed on the belt 6, and is wound onto another reel 13 when it exits from the grit-blasting cham-

ber 3. The path followed by the fabric exiting from the grit-blasting chamber 3 is defined by a pair of free rollers 14 and 15.

According to the invention, a centrifugal turbine 16 is provided above the portion of the path of the belt 6 which is arranged substantially horizontal; said centrifugal turbine is fed with grit 17 and is arranged so that its ejection outlet faces the fabric 5 placed on the belt 6 so as to eject the grit onto the side of the fabric to be treated.

More particularly, the centrifugal turbine 16 is arranged so that its axis 16a is substantially parallel to the direction of advancement of the fabric in the grit-blasting chamber 3, which is indicated by the arrow 18 in figure 1.

The centrifugal turbine 16 is actuated by means of a known variable-speed electric motor 19.

Means are advantageously provided to adjust the amount of grit fed to the centrifugal turbine 16; said means comprise a feeder hopper 20 which is arranged above the centrifugal turbine and is downwardly provided with an outlet which leads into a feed duct 21 which in turn conveys the grit to the center of the centrifugal turbine. A shutter 22 is provided on the outlet of the hopper 20; said shutter can be actuated by means of a pneumatic cylinder 23 and can be stopped by means of a limit stop 40 which can be moved by an electric motor 41 to vary the size of said outlet and therefore vary the amount of grit fed into the turbine 16.

Means for recovering the grit ejected onto the fabric are conveniently provided in the machine according to the invention. More particularly, the bottom 3a of the grit-blasting chamber 3 is inclined toward a collection hopper 24 in which a horizontal-axis screw 25 is provided; said screw conveys the grit to a vertical scoop or cup elevator 26 which returns the collected grit to the feeder hopper 20.

A dust remover 27 is advantageously arranged between the cup elevator 26 and the hopper 20.

Cleaning means are provided in order to remove the grit which may cling to the treated fabric after the treatment; said means are constituted by a first rotating brush 28, which is arranged inside the grit-blasting chamber 3 upstream the treatment region according to the direction of advancement of the fabric 5 and makes contact with the side of the fabric which is bombarded by the grit. The removed grit is conveyed from the inclined bottom 3a to the collecting hopper 24.

A second rotating brush 29 is provided outside the grit-blasting chamber 3 and acts on the other side of the fabric. A collecting channel 30, with a related screw or helix 31, may be provided below said second brush 29, to return the removed grit to the collecting hopper 24.

The operation of the machine according to the

invention is as follows.

The fabric 5 to be treated is unrolled from the reel 12 arranged at the inlet of the machine and is made to adhere to the belt 6, which advances the fabric 5 toward the inside of the grit-blasting chamber 3. The centrifugal turbine 16 is actuated beforehand, while the shutter 22 keeps the outlet of the feeder hopper 20 shut before the fabric arrives, avoiding useless dispersions of grit which may damage the belt 6.

When the belt 6 has introduced the fabric 5 in the grit-blasting chamber 3, the shutter 22 is opened by the required amount, allowing the passage of the grit which, as it reaches the centrifugal turbine 16, is accelerated and ejected onto the fabric which is passing below its ejection outlet.

The bombardment of the particles of grit thus begins; said particles bush-hammer the entire exposed surface of the fabric as it slowly passes below the region of action of the turbine 16. The grit particles 17 are ejected with a uniform fan-like distribution, strike the surface of the fabric 5, then rebound due to the elasticity of the belt 6 and drop onto the bottom 3a of the grit-blasting chamber 3.

The effect caused by this action is a peening effect which, as it occurs against an elastic body such as the fabric 5 supported by the belt 6, causes no breakage or damage but creates a succession of minute depressions on the surface of the fabric, due to the compression of the fibers of the fabric 5 which have been peened. A micro-abrasion occurs in association with this effect and superficially etches the fibers of the fabric without cutting them or interrupting them but raising a fine velvet-like fluff.

The surface of the peened fabric thus assumes characteristic variable visual and tactile appearances: in some cases, for example, it assumes the appearance of a dull fabric worn by use with a peach-skin like effect; in other cases, when the fabric is more elastic or is coated by a thin layer of elastic material, it has a tactile and visual velvet-like effect similar to that of chamois leather.

The impact of the grit particles 17 causes a spot peening of the surface of the fabric 5 without causing any damage, since the acceleration and the ejection speed of the grit may be changed by adjusting the speed of the centrifugal turbine 16 by acting on the adjustment of the rotational speed of the variable-speed electric motor 19 associated therewith.

The peening of the surface of the fabric 5 may be made more or less intense by adjusting the amount of grit ejected per unit time by the centrifugal turbine 16 by acting on the adjustment of the opening of the controllable shutter 22 which allows to increase or reduce, as well as cut off, the flow of grit fed to the centrifugal turbine 16. The intensity

of the bombardment of the surface of the fabric 5 may also be changed by acting on the adjustment of the motor reducer 11 which controls the advancement speed of the belt 6.

The various kinds of grit blasting may be performed on any kind of fabric, article or ready-made item of clothing by acting on the above described adjustments, i.e. by varying the ejection speed of the centrifugal turbine 16, by varying the amount of grit ejected by means of the controllable shutter 22 and by varying the advancement speed of the rubber belt 6.

Further particular effects may be obtained by associating a surface protection plate with the fabric to be subjected to the peening treatment; designs of any object or shape are cutout in positive or in negative on said plate, so that the peening action is performed by the machine only on the unprotected parts of the surface, thus highlighting the desired designs and configurations, which will appear peened or not depending on whether the protection plate is negative or positive.

The grit 17 is then returned, by means of the screw 25 and the cup elevator 26, to the feeder hopper 20.

The rotating brushes 28 and 29 eliminate the residues of grit from the fabric after the treatment and the fabric 5 is thus rewound onto the reel 13.

In practice it has been observed that the invention, as well as the process according to the invention, fully achieve the intended aim and objects, since by virtue of the mechanical bombardment of grit, which can be adjusted in intensity and duration according to the desired effect and to the fabric to be treated, it is possible to obtain a vast range of aesthetic effects without significantly damaging the fabric and with high productivity.

The above described machine may be fed with various kinds of grit with different characteristics, configurations, particle sizes and relative density; it is thus possible to choose the most appropriate grit in order to obtain the required aesthetic effects on the various kinds of fabric.

A further advantage, in view of the flexibility of the obtainable finishing, is that it can be applied to all kinds of fabric, with the possibility of obtaining different special effects by varying the speed and flow-rate parameters and by varying the kind of grit being ejected.

The machine and the process thus conceived are susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept. Furthermore, all details may be replaced with technically equivalent elements.

In practice, the materials employed, so long as compatible with the specific use, as well as the dimensions, may be any according to the requirements and to the state of the art.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Machine for peening the surface of fabrics, characterized in that it comprises: a grit-blasting chamber (3), means (4) for advancing the fabric (5) to be treated through said grit-blasting chamber (3), and a centrifugal turbine (16) arranged in said grit-blasting chamber (3) and fed with grit (17), said centrifugal turbine (16) being arranged so that its ejection outlet faces the side of the fabric (5) to be treated.

2. Machine according to claim 1, characterized in that said advancement means (4) are constituted by an elastically flexible belt (6) which is moved along a closed path and supports the fabric (5) on the side thereof which is opposite to the side to be treated.

3. Machine according to the preceding claims, characterized in that said centrifugal turbine (16) is arranged so that its axis of rotation (16a) is substantially parallel to the direction of advancement (18) of the fabric (5) along said advancement means (4).

4. Machine according to one or more of the preceding claims, characterized in that it comprises means for adjusting the amount of grit fed to said centrifugal turbine.

5. Machine according to one or more of the preceding claims, characterized in that said means for adjusting the amount of grit comprise a hopper (20) which overlies said centrifugal turbine (16) and is downwardly provided with an outlet which feeds a duct (21) for conveying the grit (17) to said centrifugal turbine (16), a shutter (22) being provided on said outlet, said shutter being controllably actuatable to vary the size of the opening of said outlet.

6. Machine according to one or more of the preceding claims, characterized in that it comprises means for adjusting the advancement speed of the fabric (5) through said grit-blasting chamber (3).

7. Machine according to one or more of the preceding claims, characterized in that it comprises means for adjusting the rotational speed of said centrifugal turbine (16).

8. Machine according to one or more of the preceding claims, characterized in that it comprises means for recovering the grit ejected onto the

fabric.

9. Machine according to one or more of the preceding claims, characterized in that said grit recovering means comprise a bottom (3a) of said grit-blasting chamber (3) which is inclined toward a collection hopper (24) which is provided with a screw (25), having a substantially horizontal axis, which feeds a lifting device (26) which conveys the collected grit (17) into said feeder hopper (20).

10. Machine according to one or more of the preceding claims, characterized in that a dust remover (27) for the grit is arranged between said lifting device (26) and said feeder hopper (20).

11. Machine according to one or more of the preceding claims, characterized in that it comprises means (28, 29) for cleaning the fabric (5) after treatment.

12. Machine according to one or more of the preceding claims, characterized in that said cleaning means (28, 29) comprise at least one rotating brush (28) which is arranged in said grit-blasting chamber (3) upstream said centrifugal turbine (16) according to the direction of advancement of the fabric and makes contact with the side of the fabric (5) which is subjected to the treatment.

13. Process for peening the surface of fabrics, characterized in that it consists in a mechanical action of bombarding the fabric (5) with grit (17).

14. Process according to claim 13, characterized in that the fabric (5) to be treated is arranged, with its side which is opposite to the side to be treated, on an elastic support (6) which absorbs the impact blow of the grit particles (17) ejected against the fabric (5).

15. Process according to claims 13 and 14, characterized in that said bombardment is performed by means of a centrifugal turbine (16) fed with grit (17) and arranged so that its ejection outlet faces the side of the fabric (5) to be treated.

16. Process according to one or more of the preceding claims, characterized in that the side of said fabric (5) to be treated is coated with a thin layer of elastically deformable material.

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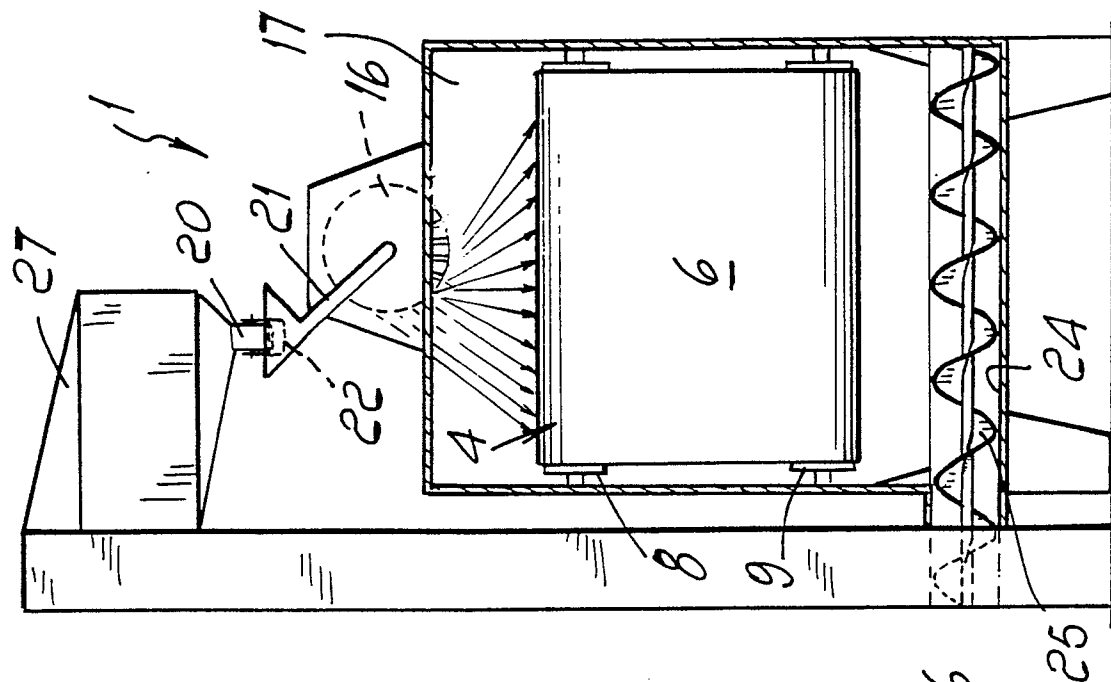


Fig. 2

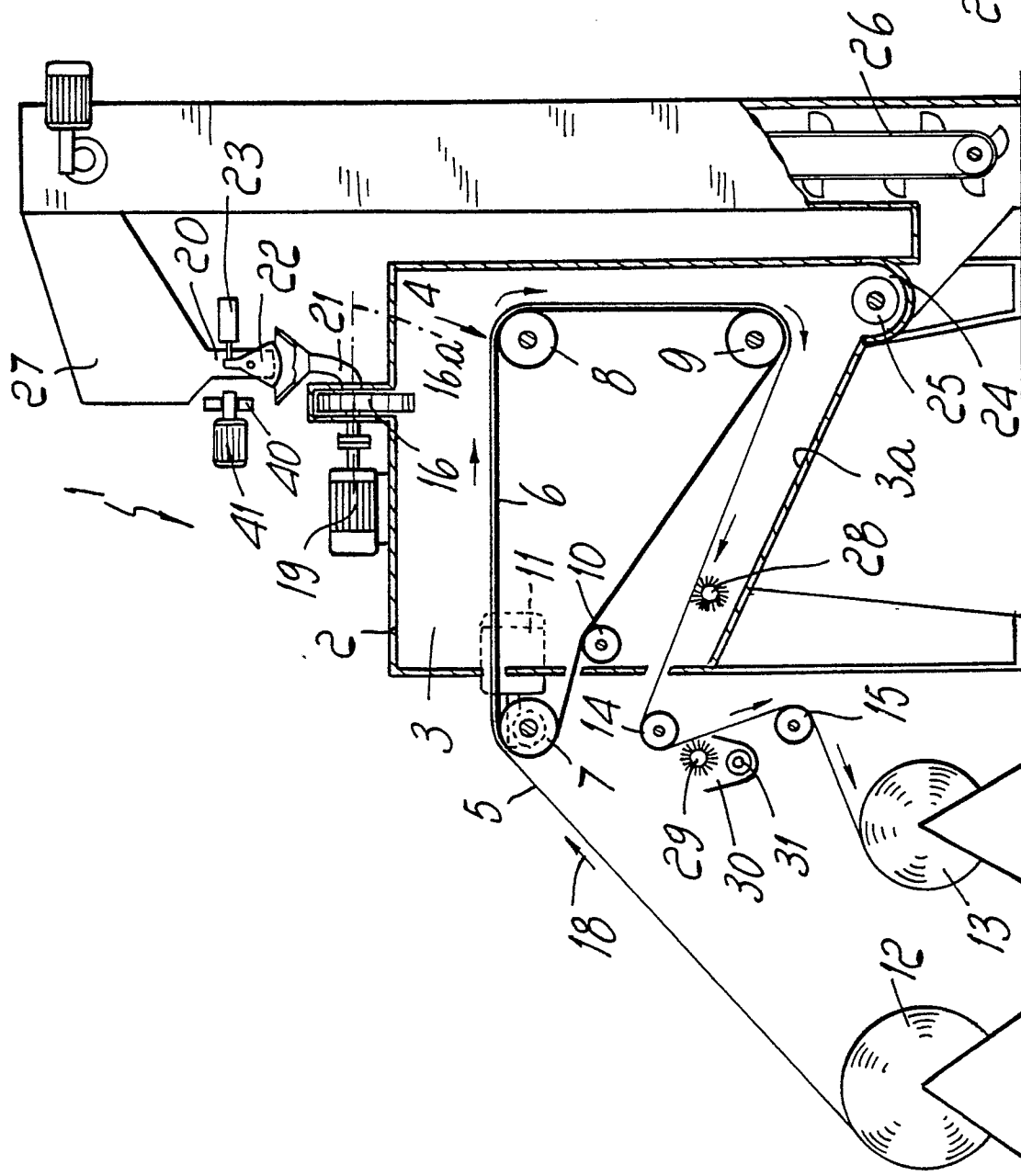


Fig. 1



EP 89 11 2114

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-252317 (GELLER) * the whole document * ---	1-15	D06B11/00 D06C19/00
A	EP-A-263498 (ULMER) ---		
A	US-A-2277937 (SHRYER) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D06B D06C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 SEPTEMBER 1989	Examiner PETIT J. P.
CATEGORY OF CITED DOCUMENTS			
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