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(71) Applicant : **Yoshida Kogyo K.K.**
No. 1 Kanda Izumi-cho
Chiyoda-ku, Tokyo (JP)

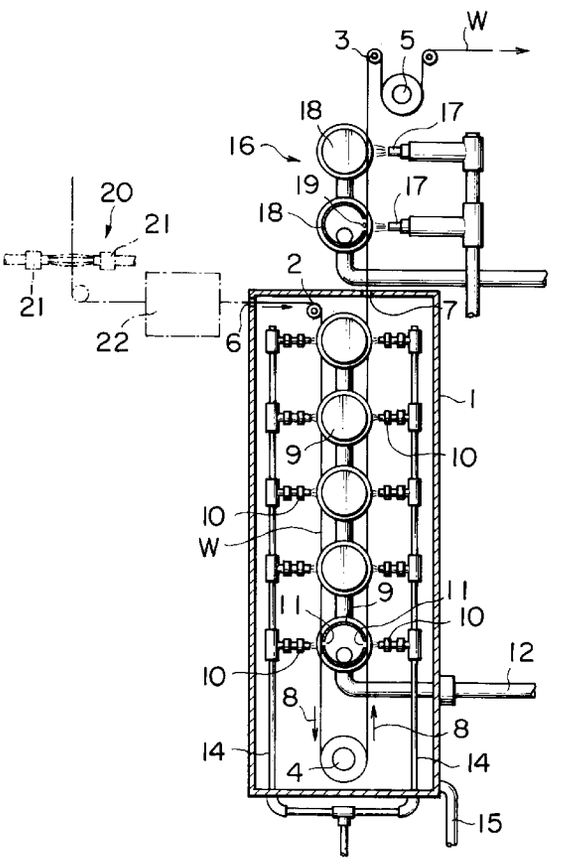
(72) Inventor : **Yamakita, Yoshimichi**
2075, Ide
Uozu-shi, Toyama-ken (JP)

(74) Representative : **White, Martin David et al**
MARKS & CLERK 57/60 Lincoln's Inn Fields
London WC2A 3LS (GB)

(54) Washing system for long fabric strip.

(57) In a washing system, a long fabric strip (W) is guided along a conveying path (8) in the washing system. The fabric strip (W) is washed by washing liquid injected by injection nozzles (10). Since used washing liquid is drained via drainpipes (9), the fabric strip (W) is always washed by clean washing liquid.

FIG. 1



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BACKGROUND OF THE INVENTION

1. Field of the Invention:

This invention relates to a washing system for washing a long strip of fabric such as a slide fastener chain, slide fastener tape, surface fastener and ribbon.

2. Description of the Related Art:

As is well-known, surplus dye remains adhered on fabric after it is dyed. Such surplus dye should be washed off from the fabric. With a conventional washing system, a long fabric strip is brought into a washing tub filled with washing liquid, steeped in the tub, guided up and down in a meandering manner, washed therein, and then drawn out from the washing tub. Sometimes a plurality of washing tubs are arranged in rows to wash the fabric strip therein.

With this conventional washing system, the dyed fabric strip should be very slowly guided through the washing tubs. This washing system is disadvantageous in that washing efficiency cannot be improved and a great amount of washing liquid has to be provided for satisfactory washing. At present, there is a great demand for production of a good assortment of fabric strips in small amounts. In some cases, a slide fastener tape is dyed in one color for up to, say, some ten meters and is then dyed in a different color, and so forth. To wash such slide fastener tape by the conventional washing system, it is necessary to stop the washing system according to the dye colors and to use new clean washing liquid. Therefore the conventional washing system is not suitable to washing such fabric strip which is sectionally dyed in different colors.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide a washing system which can overcome the inconveniences of the conventional washing system and wash the long fabric strip efficiently without using a great amount of the washing liquid, coping with the demand for production of a variety of long fabric strips in a small amount.

According to this invention, there is provided a washing system for a long fabric strip, comprising: a plurality of injection nozzles located at one side of a conveying path and spaced from one another for injecting washing liquid into the fabric strip; and a plurality of drainpipes located at the other side of the conveying path in association with the injection nozzles and having hollow portions for absorbing the washing liquid injected by the injection nozzles.

With this arrangement, the washing liquid is injected by the injection nozzles toward the dyed fabric strip guided along the conveying path. The stained washing liquid is sucked into the drainpipes so that the washed fabric strip will not be stained. Even when it is dyed in different colors, the fabric strip can be always washed by clean washing liquid without interrupting the washing process.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of a washing system for a long fabric strip according to this invention; and

FIG. 2 is an enlarged perspective view of a main part of the washing system.

DETAILED DESCRIPTION

As shown in FIG. 1, a washing system comprises components located in and outside a hollow housing 1. A guide roller 2 is located at an upper portion in the housing 1, and a guide roller 3 is located above the housing 1. Drawing-in and drawing-out rollers 4, 5 are respectively located at the bottom of and above the housing 1. The guide rollers 2, 3 and the drawing-in and drawing-out rollers 5, 6 form a path 8 (indicated by arrows in FIG. 1), which downwardly leads a dyed fabric strip W into the housing 1 via an inlet 6 at the upper portion of the housing 1, then upwardly via the roller 4 toward an outlet 7 at the top of the housing 1. The path 8 is in the shape of U in the housing 1.

A plurality of drainpipes 9 are arranged with preset intervals in parallel to the roller 4 in the U-shaped space of the path 8. A pair each of injection nozzles are associated with each drainpipe 9 to inject washing liquid (i.e. hot water) to the outer surface of the drainpipe 9 via the dyed fabric strip W guided along the path 8. As shown in FIG. 2, the injection nozzles 10 inject the washing liquid flatly and divergently onto the fabric strip W. The drainpipes 9 have intakes 11 to receive the washing liquid therein.

The drainpipes 9 are communicated by a pipe 12. The washing liquid received in the drainpipes 12 is drained by a pump and an absorption canister (which are not shown in FIG. 1). As shown in FIG. 2, each drainpipe 9'has a pair of flanges 13 13 at its opposite ends so that the dyed fabric strip W is guided in contact with the outer surface of the drainpipe 9 between these flanges 13, 13. A plurality of narrow fabric strips W may be simultaneously conveyed on the drainpipes 9 to be washed together. Each of the right and left injection nozzles is connected to each branch of the feed pipe 14. An exhaust port 15 is located at the bottom of the housing 1.

A dehydrator 16 is positioned above the housing 1 to dehydrate the washed fabric strip W. The dehydrator 16 of FIG. 1 comprises a plurality of air nozzles 17 which are arranged vertically with preset spaces. Exhaust pipes 18 are installed in front of these air

nozzles 17 to be in contact with the fabric strip W, having intake ports 19.

In the foregoing embodiment, one drainpipe 9 is associated with each pair of injection nozzles 10. On the contrary, one drainpipe 9 which is long and has flat portions may be used to serve a plurality of the injection nozzles 10. Such drainpipe 9 has intake ports associated with respective injection nozzles 10.

The U-shaped path 8 is advantageous to make the washing system compact and to dispose a pair of the injection nozzles 10 for each drainpipe 9, thereby simplifying the washing system. Otherwise, the path 8 may be straight.

An example of a dyeing unit 20 is shown in the left upper part of FIG. 1. The dyeing unit 20 spray-dyes to both surfaces of the fabric strip W, guiding it through a steamy atmosphere 22 to fix the dye color. Then the spray-dyed fabric strip W is guided into the washing system. In such arrangement, the fabric strip W can be dyed in different colors to desired lengths, which is advantageous to produce a good assortment of dyed fabric strips W in a small amount.

The dyed fabric strip W is conveyed along the path 8 to be washed by the washing liquid supplied by the injection nozzles 10. The stained washing liquid is completely drained into the drainpipes 9 by the suction pump. The washed fabric strip W is then dried by hot air applied via the air nozzles 17 of the dehydrator 16. Thus, the fabric strip W is always washed by clean washing liquid, being not affected by the stained washing liquid.

The dyed fabric strip W is conveyed with its one side in contact with the outer surface of the drainpipes 9. The other side of the fabric strip W confronts with the injection nozzles 10 with a preset space therebetween. Even a surface fastener can be reliably washed without damaging hook elements embedded thereon.

By means of this invention, a long fabric strip is conveyed along the path to be washed by the washing liquid sprayed by injection nozzles, which are located along the conveying path with the preset spaces. The drainpipes are associated with respective injection nozzles to receive the used washing liquid. The fabric strip is successively washed by clean washing liquid. Therefore, even if it has differently colored portions, the fabric strip can be continuously washed by clean washing liquid, thereby improving the washing efficiency. It is also possible to reduce the amount of the washing liquid.

Claims

1. A washing system for a long fabric strip (W), comprising:
   (a) a plurality of injection nozzles (10) located at one side of along a conveying path (8) and spaced from one another for injecting washing liquid into the fabric strip (W); and
   (b) a plurality of drainpipes (9) located at the other side of the conveying path (8) in association with said injection nozzles (10) and having hollow portions (11) for absorbing the washing liquid injected by said injection nozzles (10).

2. A washing system as claimed in claim 1 and comprising a) guide rollers (2,3) and/or b) drawing-in and drawing-out rollers (4,5).

3. A washing system as claimed in claim 1 or 2 in combination with a dyeing unit (20) arranged upstream of said washing system.

4. A combination of washing system and dyeing unit (20) as claimed in claim 3, wherein the dyeing unit (20) is adapted for dyeing sections of the fabric strip (W) in different colors.

FIG. 1

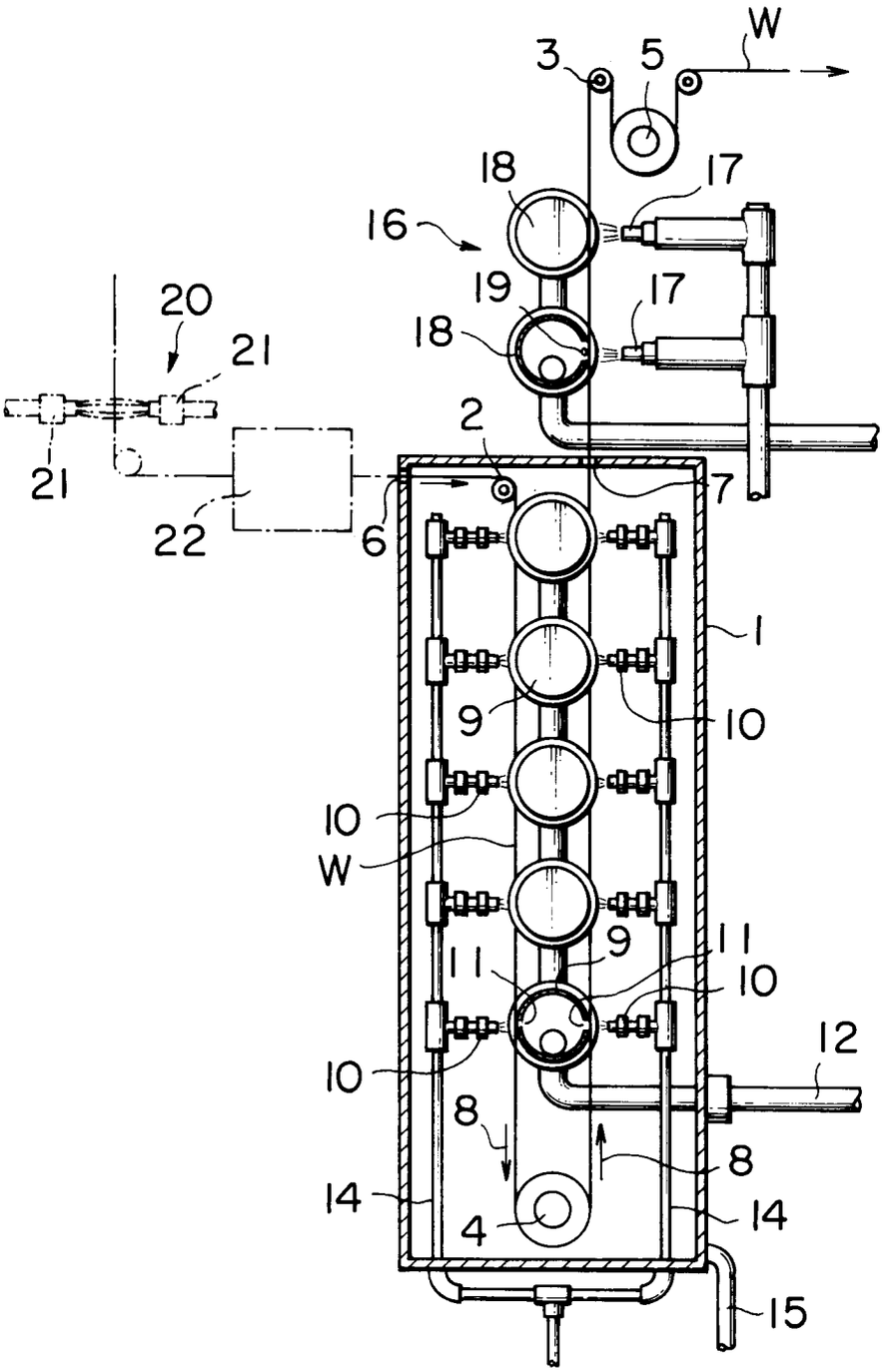
W
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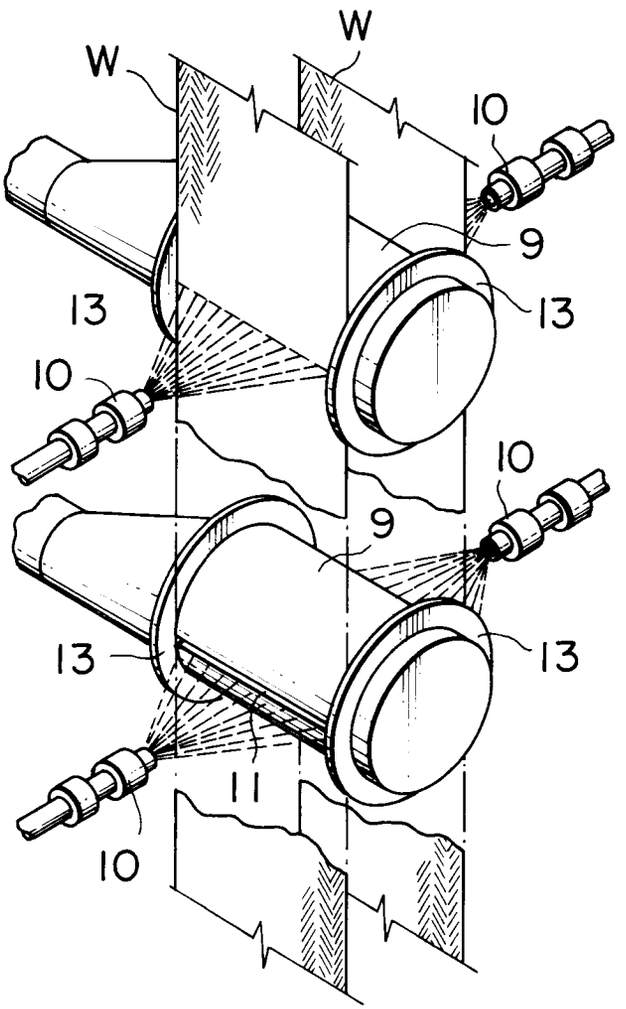
FIG. 2



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EUROPEAN SEARCH REPORT

Application Number

EP 91 30 9529

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-0 180 755 (BABCOCK) * the whole document *	1-3	D06B5/08
X	GB-A-2 117 806 (ALBANY) * the whole document *	1,2	
X	FR-A-1 374 161 (SIR JAMES FARMER NORTON) * the whole document *	1,2	
X	DE-A-3 012 612 (KONRAD HORNSCHUCH) * the whole document *	1,2	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 FEBRUARY 1992	PETIT J.P.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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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
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