March 2, 1971 V. APPENZELLER 3,566,630

CONTINUOUS CARPET DYEING DEVICE

Filed Dec. 19, 1968 4 Sheets-Sheet 1

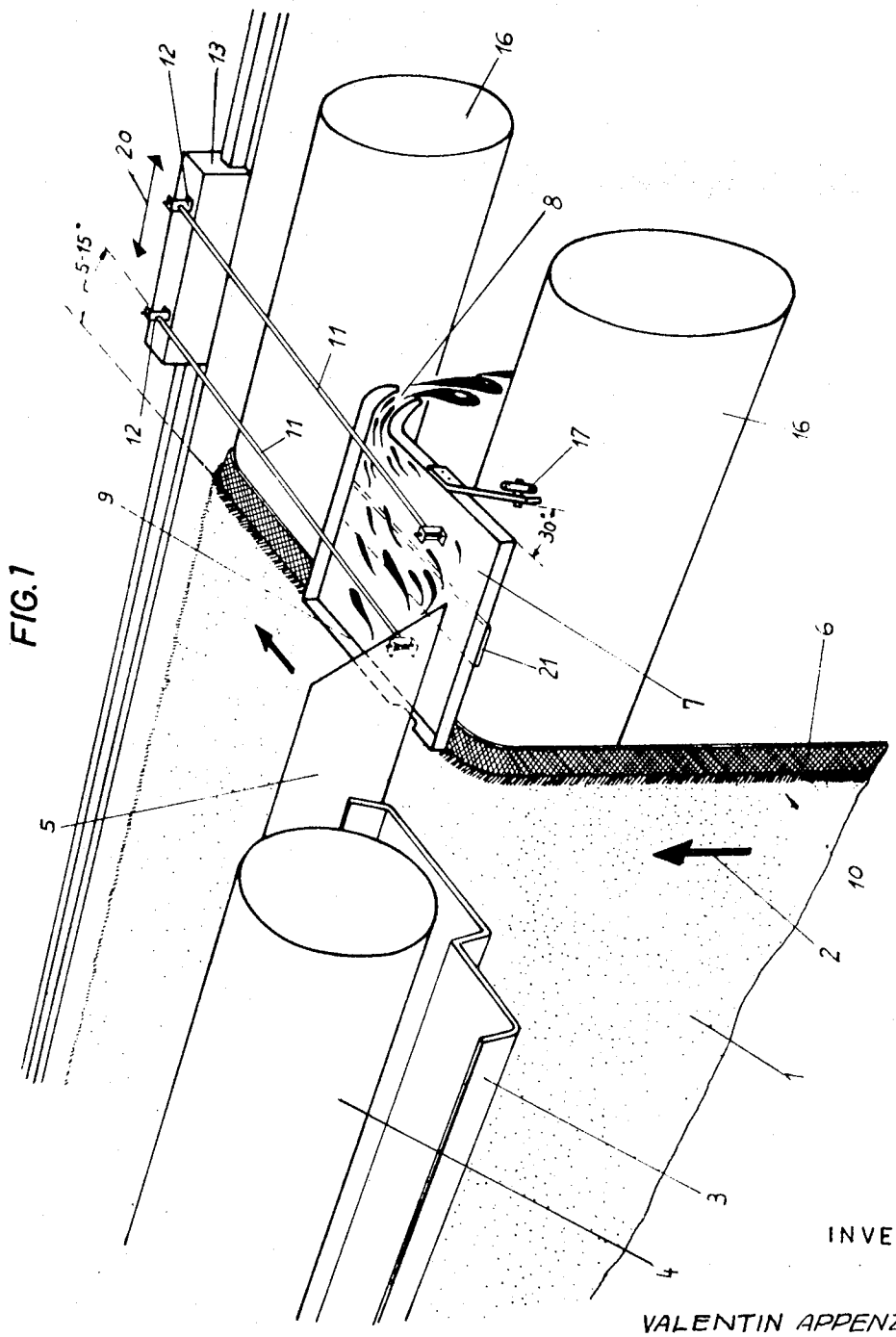

FIG. 1

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FIG.2

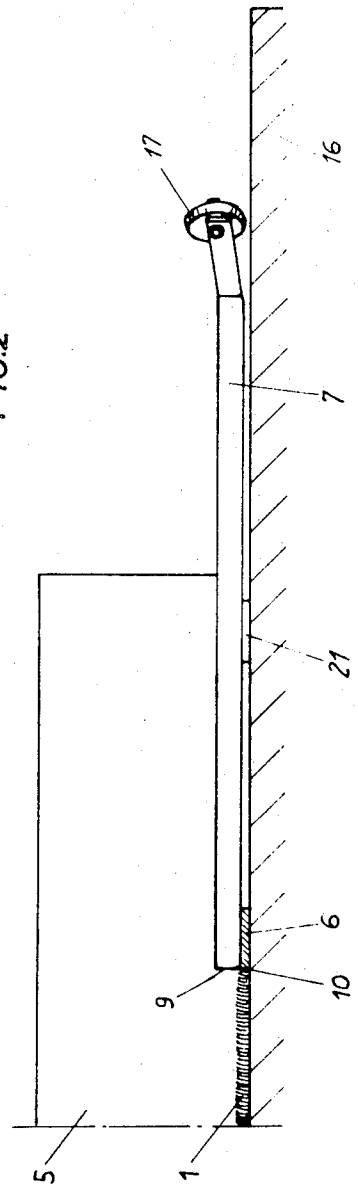

FIG.3

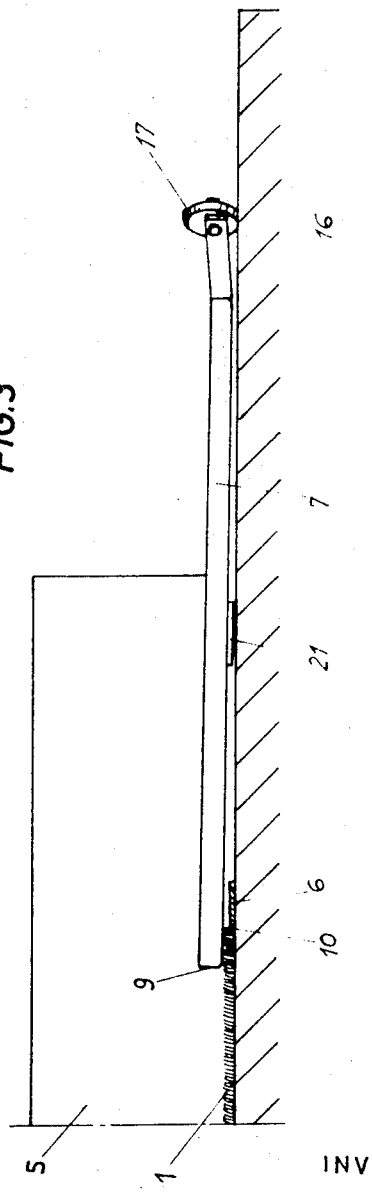

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FIG.4

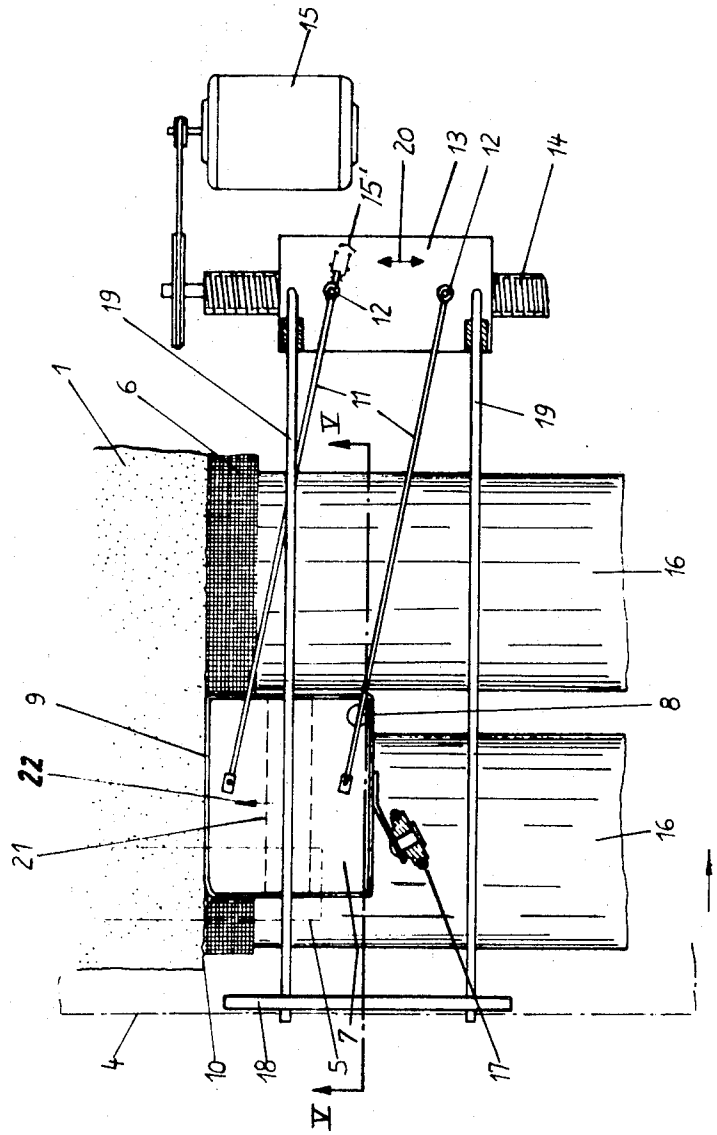

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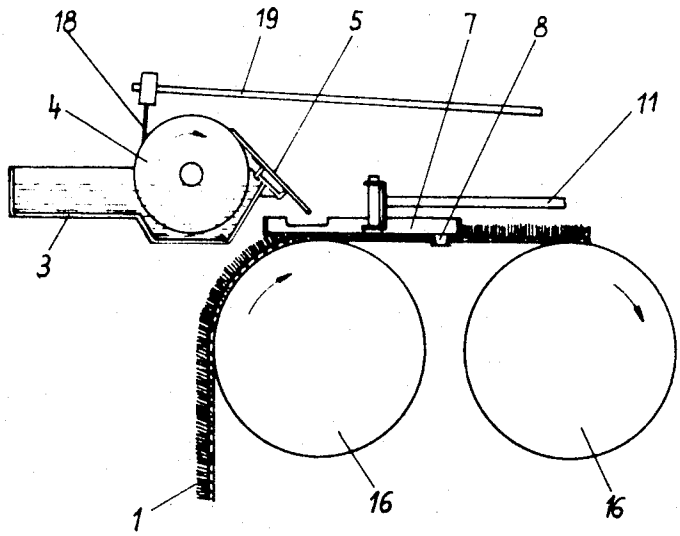
FIG. 5



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CONTINUOUS CARPET DYEING DEVICE

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Claims priority, application Germany, Dec. 23, 1967, P 16 35 013.3
Int. Cl. B05b 13/02; D06f 35/00
U.S. Cl. 68—205 4 Claims

ABSTRACT OF THE DISCLOSURE

A trough or pan has a side positioned laterally against the upstanding pile edge of continuously traveling carpet to prevent liquid dye falling on the pile from also falling on the backing that extends laterally beyond the pile. This permits the manufacture of carpet having a pile dyed in a continuous manner after the pile is attached to the backing, without the backing being dyed inadvertently where it extends laterally beyond the pile.

This invention relates to a device for use in the continuous dyeing of machine-made carpet.

Machine-made carpet has a backing which is usually pre-woven from jute yarn, craft cord, cotton and possibly man-made fibers. A pile is attached to this backing by weaving, tufting or the like. The carpet is in the form of relatively long continuous lengths and the backing extends laterally beyond both sides of the pile.

To continuously dye such carpet after the pile is attached to the backing, the length is caused to travel continuously with its pile uppermost and dyeing liquid is flowed or showered on the pile so that the volume falling on the pile is uniform transversely with respect to the carpet. The traveling speed of the carpet and the flow rate of the dye are adjusted so that the dyeing liquid is entirely absorbed by the pile without penetrating to the backing. The result is a carpet having a dyed pile and an undyed backing.

The width of the carpet may vary somewhat and to make certain that the pile along the edge portions of the traveling strip is dyed completely the flow of dyeing liquid must extend laterally beyond the opposite edges of the pile. If this liquid penetrates the portions of the backing which extend laterally beyond the pile, it bleeds laterally inwardly into the backing beneath the pile causing the color of the pile edge portions to be different from that of the pile between these portions. This is undesirable.

The object of the present invention is to provide a device for use in such continuous dyeing of machine-made carpet, which prevents such inadvertent dyeing of the carpet backing.

With the foregoing in mind, the present invention involves the use of a trough or pan on each side of the traveling carpet above the laterally projecting edge portions of the backing. Each trough or pan has a straight side parallel to the traveling pile edge and is provided with means for biasing this side lightly, but positively, against the pile edge. Thus the trough or pan can catch the dyeing liquid so as to prevent it from getting on the laterally projecting backing. The pile may vary in width and where one carpet length is attached to another the pile edges may not be in exact longitudinal registration. In such instances, one or the other of the troughs or pans may ride over the top of the pile, and to prevent this each trough or pan is provided with a sensing system which detects the lifting of the side of the trough or pan when it does ride over the pile, this system being combined with a means for automatically and quickly causing the trough

or pan to move transversely away from the overrun pile edge until the pan is again located with its straight side pressing lightly against the pile edge above the laterally projecting edge portion of the backing.

A specific example of the invention is disclosed by the accompanying drawings in which:

FIG. 1 is a perspective view showing a device embodying the principles of the present invention and being used in connection with the dyeing of a continuously traveling length of machine-made carpet;

FIG. 2 is an end elevation of the trough or pan showing the action involved during normal operation;

FIG. 3 is the same as FIG. 2 excepting that it shows the action involved when the pan rides over the pile of the carpet so that it needs to be returned to its normal position shown by FIG. 2;

FIG. 4 is a top view of the device shown by FIG. 1 and illustrates a modification; and

FIG. 5 is a cross section taken on the line V—V in FIG. 4.

In this example, the carpet 1 is continuously traveling in the direction indicated by the arrows 2.

The dyeing liquid is maintained at a predetermined level in the container 3, and a rotating roller 4 dips into the dyeing liquid in this container to pick up a layer of the dyeing liquid on this roller's periphery. The roller turns towards a doctor blade 5 which strips the dyeing liquid from the roller, the latter rotating toward this blade. The dyeing liquid flows down the doctor blade, which slants forwardly toward the carpet, and on the upstanding pile of the carpet 1. Thh roller and doctor blade extend for the full width of the carpet and on each side laterally beyond the edge of the pile of the carpet 1 and over the laterally projecting portion of the backing 6 of the carpet. Without the device of the present invention it is possible for the dyeing liquid flowing down the blade to flow on the exposed portion of the backing 6 beyond the pile of the carpet.

In the drawings only one side of the traveling strip of carpet is shown and only one device of the present invention is therefore also shown, but it is to be understood that there will be a corresponding device for the opposite side of the traveling carpet.

The device of the present invention comprises a flat, relatively shallow rectangular trough or pan 7 having a drain 8 in one of its corners remote from the traveling carpet. This trough or pan is laterally movable and has its side portion adjacent to the carpet located under the doctor blade 5 with its straight side 9 on that side touching or pressing lightly against the edge 10 of the pile of the continuously traveling carpet. The sides of the trough or pan are upstanding to retain the dyeing liquid and being straight at least on the side 9 so it can ride smoothly against the upstanding pile edge of the carpet. The bottom of the trough or pan which rides on the backing is also smooth and flat.

The carpet travels over two interspaced parallel rollers 16, the rear one of which is located under the doctor blade 5. The trough or pan 7 rests directly on this rear one of the rollers 16 so that it rides frictionally on this roller's upper periphery which is turning in the traveling direction of the carpet. Thus, the trough or pan 7 frictionally receives a biasing force in the traveling direction of the carpet.

The trough or pan 7 is held against the above biasing force by parallel arms 11 which are pivotally attached to the trough or pan. These arms extend forwardly in the carpet's traveling direction, their other ends being pivotally attached by pivots 12 to a laterally slidable mount 13 located ahead of both of the rollers 16. This mount 13 is laterally positioned so that the two arms 11 form an

angle of from five to fifteen degrees, or thereabouts, to the pile edge 10 of the traveling carpet. Therefore, the biasing force resulting from the frictional contact between the bottom of the trough or pan and the forwardly turning periphery of the roller 16, on which the trough or pan rests, is translated to a lateral biasing force pressing the side 9 inwardly against the upstanding pile edge 10 in the manner shown by FIG. 2. The mount 13 must be held against lateral displacement from its position providing the two rods 11 with angularities within a range providing the effect described. If this angularity is excessive, the pan will press too heavily against the pile edge 10 and may become displaced excessively in the traveling direction of the carpet. If the angularity is too small, the side 9 of the trough or pan will not receive adequate lateral biasing force to provide the effect described.

With the above in mind, as shown in FIG. 4, the mount 13 may be fixed in screw-thread engagement with a screw 14 which is parallel to the rollers 16 and in front of both of these rollers and is rotated in opposite directions by a reversing motor 15 controlled by two limit switches 15' actuated by one of the arms 11. Rotation of the motor 15 moves the mount 13 in one direction or another as indicated by the two-headed arrow 20. The limit switches 15' are set so that if the pan 7 moves excessively in the direction of the carpet, the mount 13 is shifted in the same direction to maintain the proper angle of the arms 11. Excessive movement of the pan 7 in the opposite direction results in the mount 13 shifting in that direction. Thus, the angularity of the arms 11 may be kept within an operative range when necessary because of widely varying pile widths.

It is obvious that if the pile edge 10 of the carpet 1 shifts laterally with respect to the center of the traveling carpet, the side 9 of the trough or pan will continue to be pressed lightly against the pile edge with the trough or pan protecting the backing 6 at all times. However, if the pile edge moves towards the pan, due to the traveling of the carpet, in an abrupt manner such as may occur where two lengths of carpet are interconnected with the pile edges out of registration, it becomes possible for the side of the pan to ride over the top of the pile in the manner indicated by FIG. 3. Obviously, such a condition must be corrected quickly.

Such correction is effected by a roller 17 in conjunction with the trough or pan 7 with a fulcrum bar 21 which extends at right angles to the roller 16. The trough or pan rests on the roller 16 by way of this fulcrum bar 21, the trough or pan balancing so that normally its side 9 presses downwardly lightly on the backing 6. The roller 17 is located so that when the trough or pan is in this normal or operating position, the roller 17 is free from the roller 16, but when the side 9 of the trough or pan 7 is lifted by riding over the carpet pile, in the manner shown by FIG. 3, the roller 17 is brought into contact with the roller 16.

Now, the axis of the roller 17 forms an angle with the axis of the roller 16 so that the peripheries of the two rollers are at an angularity of some 30 degrees, for example, and therefore the roller 17 is in effect screwed by the roller 16 in a direction pulling the trough or pan 7 away from the carpet pile edge. As soon as the pan side 9 falls down so that it can press laterally against the pile edge again as in FIG. 2, the trough or pan tilts back so that the roller 17 lifts and its described action immediately terminates.

This angularity of the roller 17 should be in a direction that diverges outwardly from the axis of the roller 16 in a direction opposite to the rotation of the latter.

As an aid to the function of the trough or pan 7, the roller 4 which picks up the dyeing liquid may be provided with a scraper 18 moved back and forth over the outer edge of the roller 4, by means of arms 19 rigidly attached to the scraper 18 and to the shifting mount 13. This scraper is thus always positioned outwardly from the periphery of the roller 4 required to pick up the dyeing liquid for dyeing the carpet pile. The scraper is always located just a little outwardly beyond the necessarily active area of the roller 4 and aids in reducing or eliminating the volume of dyeing liquid flowing down on the carpet slightly beyond the edge of the pile of the carpet. Thus in this instance the pan side 9 functions as a guide to keep this scraper 18 properly located to remove dyeing liquid from the periphery of the roller 4 throughout its area just beyond that required to flow the dyeing liquid down on the carpet pile.

It can be seen from the foregoing that the described device adequately prevents inadvertent dyeing of the carpet backing projecting laterally beyond the pile of the traveling length of carpet.

What is claimed is:

1. Apparatus for applying liquid to a continuously traveling length of fabric having a backing and a pile attached to the backing with the latter having a portion projecting laterally beyond the pile on at least one side of the length, said apparatus including a rotating roller over which the length travels with its nap uppermost and a system for flowing or showering the liquid down on the width of this nap and at least a part of said portion of its backing; characterized by a device for preventing the liquid from contacting said portion of the fabric's backing and comprising a laterally movable trough or pan positioned over said portion of the backing and having a side positioned laterally against the edge of the pile, and means for biasing the trough or pan towards said edge so its said side presses thereagainst over a range of lateral positions of this edge; said trough or pan of said device resting frictionally on said roller and said biasing means being formed by a plurality of rods that pivotally connect with the trough or pan and extend forwardly, and a forwardly located mount to which the forward ends of said rods pivotally connect and which is positioned so that the rods angle backwardly towards the edge of the pile of said fabric.

2. The apparatus of claim 1 in which said trough or pan has a bottom fulcrum on which it rests on said roll with a normal lateral tilt causing said side of the trough or pan to also rest on said backing but to oppositely rock when said side rides over the fabric's pile, and a roller connected to said trough or pan and contacting the first-named roller when the trough or pan thus rocks and having an angularity with the first-named roller causing it to have a screw action therewith pulling the trough or pan away from said pile.

3. The apparatus of claim 1 in which said mount has means for moving it laterally and which is automatically responsive to the angularity of said rods.

4. The apparatus of claim 3 in which said mount has means for controlling said system to prevent it from flowing or showering the liquid on said portion of the backing remote from the edge of the pile of the fabric.

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ROBERT L. BLEUTGE, Primary Examiner

U.S. Cl. X.R.

68—211; 118—301