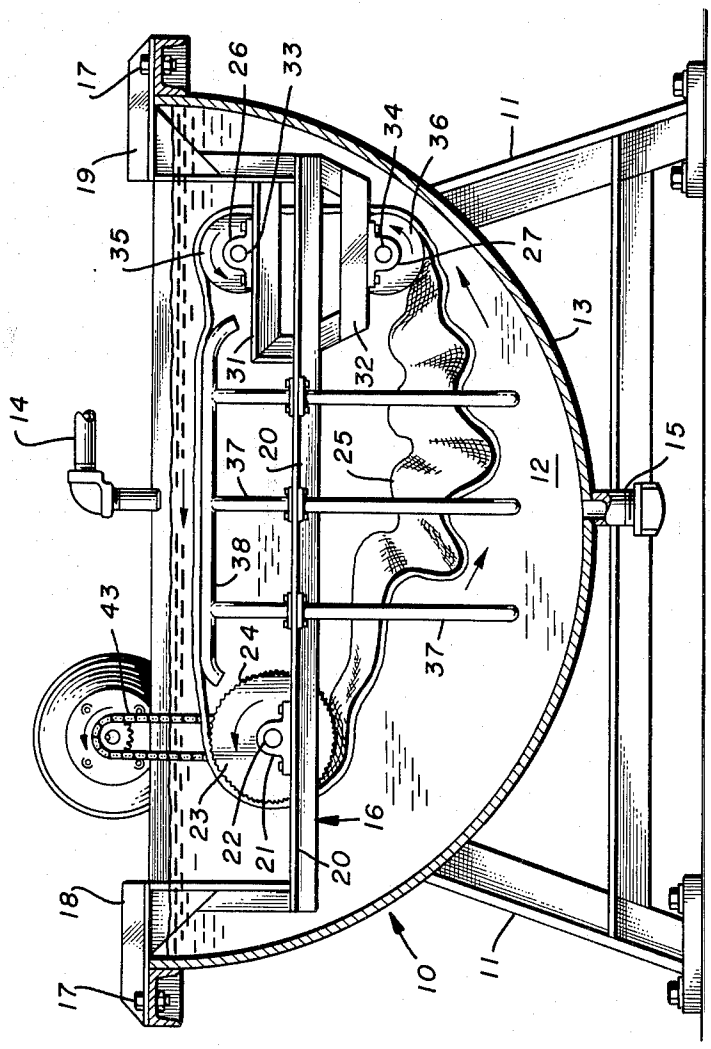
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APPARATUS FOR DYEING PILE CARPETS

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APPARATUS FOR DYEING PILE CARPETS

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This invention relates to dyeing and, more specifically, to an apparatus for piece dyeing carpets, rugs and the like.

In the manufacturing of carpets and especially in the manufacture of carpets having the piles or tufts which are comprised of synthetic fibers, certain problems are encountered when the dye is applied thereto. When the carpets are subjected to the high temperature of a dye bath, the filaments comprising the pile have a tendency to wilt and lay down. If the temperature of the dye bath is kept relatively low, the dye receptivity of the synthetic filaments is greatly reduced thereby limiting the effectiveness of the dyeing operation and reducing the aesthetic value of the carpet. The pile may be dyed before being tufted into the carpet scrim, however, such a practice limits the flexibility with which the dye may be applied to the carpet for once dyed, it cannot be re-dyed by the normal process. The main problem in piece dyeing centers around keeping the pile erect throughout the dyeing cycle for the synthetic piles characteristically retain the position last obtained when cooled from a heated state. When piece dyeing carpet and the like in a conventional dye vat, the ends of a length of carpet are sewn together after it has been laid over and around advancing rollers. A portion of the carpet hangs over the rollers and is emersed in a dye liquor which partially fills the dye vat. The carpet is moved by the advancing roller through the dyeing liquor in a continuous belt fashion. As a segment of carpet emerges from the dye bath, the liquor due to gravity runs down the surface thereof and back into the dye bath. Since the liquor is hot and since the emersing operation is repeated several times, the carpet pile tend to slant in the direction of the liquor flow and upon cooling, remains in that position. It is to this disadvantage that the attention of this application will be directed. Therefore, an object of this invention is to provide an apparatus for dyeing carpet which leaves the pile in an erected position.

Another object of this invention is to provide an apparatus for piece dyeing carpet by completely submerging the same.

A further object of this invention is to provide a carpet the pile of which retains resilience and erectness after being dyed.

Other objects and advantages of this invention will become apparent when the following detailed description is read in conjunction with the appended drawings, specifications, and claims. The preferred embodiment of this invention will now be described with reference to the accompanying drawings.

The figure is a front elevational, sectional view of the apparatus used to perform this process showing the carpet draped around the rollers with the excess extending into the lower portions of the dye vat and collecting there.

In general, this invention consists of a tank or fluid receptacle which receives a positively driven roller that is horizontally mounted for rotation about its axis. The driven roller is provided with a knurled surface which frictionally engages carpet backing or scrim thereby aiding in the movement of the carpet through its orbital path. The carpet is laid over the driven roller, around other idler rollers and the ends thereof are sutured thereby forming an endless belt. The remainder of the carpet is allowed to drape in the bottom of the fluid receptacle.

Dyeing liquor is allowed to fill the fluid receptacle thereby covering the cloth or carpet completely. In operation, the driven roller is powered by any conventional means and its knurled surface frictionally engages the carpet backing and advances the same. The carpet pile stands erect and is not forced down by the action of advancing rollers or the weight of gravitationally induced dyeing liquor. The carpet pile only comes in contact with the dye liquor. The carpet is continuously moved through the dye bath thereby insuring proper dyeing for if the dyeing liquor does not properly circulate around the filaments comprising the pile, streaks are left therein. After the piled carpet has completed its dyeing cycle, the dye liquor is partially drained from the dye vat, the stitch used to form the suture is severed and the carpet is removed from the dye vat and allowed to dry. Once the carpet is removed from the heat, the filaments comprising the pile become hard again and regain their former bulkiness and resilience and since the pile was not mashed down during the dyeing cycle, they stand erect for the filaments remain in their precooled position.

This invention is illustrated in connection with the accompanying drawings in which the figures are illustrative of the preferred embodiment of the invention. It is to be understood that this invention is applicable to other fabrics than that generally described.

A dye vat or fluid containing receptacle **10** is mounted on legs **11** and serves to receive a dye liquor **12**. The dye vat **10** is of open construction and has an arcuated bottom **13** although the particular design thereof is of little importance. The dye liquor **12** enters the dye vat **10** through a supply pipe **14** which is connected to a source. After the dye liquor **12** has been used, it may be recycled or dumped into a waste line through waste exhaust line **15**. It is also contemplated that the supply pipe **14** and the exhaust line **15** may cooperate to continuously circulate the dyeing liquor **12** during the dyeing period for the better the circulation the more uniformly the carpet is dyed.

Frame **16** is rigidly secured to fluid receptacle **10** by means of a nut and bolt arrangement **17**. The frame **16** is comprised of connecting beams **18** and **19** and support beam **20**. Connecting beams **18** and **19** join at each end of supporting beam **20**, thereby positioning it in dye vat **10**. Supporting beam **20** indirectly receives and positions all of the rollers used to advance a carpet **25** along its path. Bearings **21** are rigidly mounted on supporting beam **20** and serve to receive an axle **22** which is journaled therein. Axle **22** comprises a part of advancing roller **23** thereby adapting the same for rotation about its axis. This axle receives a rotating force from a chain and sprocket arrangement **43**; however, it is to be understood that the advancing roller **23** may be put in motion by any torque conveying mechanism with equal effectiveness. Advancing roller **23** has a knurled outer surface **24** for catching and advancing the carpet **25**; this surface may be provided with barbs for facilitating the movement thereof. Idler bearings **26** and **27** are secured to seats **31** and **32**, respectively, which extend from frame **20**; also, idler bearings **26** and **27** serve to receive axles **33** and **34**, respectively, which are journaled therein. Idler rollers **35** and **36** are rigidly received by axles **33** and **34**, respectively, and are adapted to reduce friction between the carpet **25** and the path through which it travels. Also securely mounted on the frame **20** are guiding and aligning bars **37** which extend upwardly and downwardly therefrom. These bars keep the carpet **25** from walking off of the edge of the rollers and becoming entangled therein. A plate **38** is attached to the upper ends of guide bars **37**, provides a surface across which the carpet **25** may slide, and guides the carpet **25** from idler roller **35**

to advancing roller 23. The bars 37 in cooperation with the plate 38 and the various rollers also function to provide a path through which the carpet 25 travels.

It is obvious that a long length of carpet may be dyed at one time for while a portion of the carpet 25 is drawn relatively taut between idler roller 35 and advancing roller 23, the rest may be allowed to drape in the bottom of the dye vat 10.

Many different embodiments of this invention may be made without departing from the scope and spirit thereof. It is contemplated that many combinations of rollers may be used in moving the carpet along its path. Therefore, it is to be understood that this invention is not to be limited to the specific embodiment shown and described herein, except as defined in the appended claims.

What is claimed is:

1. An apparatus for dyeing a carpet comprising:
(a) a dye vat, said dye vat being adapted to receive a dyeing liquor,
(b) a structural frame being mounted on and being securely attached to said dye vat and extending below the surface of said dyeing liquor,
(c) an advancing roller being rotatably mounted on said frame, said advancing roller having a knurled surface being adapted to frictionally engage said carpet thereby adapting said advancing roller for advancing said carpet along a path,
(d) an idler roller being rotatably mounted on said frame and disposed from said advancing roller, said idler roller cooperating with said advancing roller to continuously move said carpet through said dyeing liquor, said carpet being completely submerged therein,
(e) aligning bars being rigidly secured to said structural frame and extending above and below said structural frame, said aligning bars being adapted to position said carpet on said rollers, and
(f) a plate being mounted on the upper ends of said aligning bars and being adapted to guide said carpet from said idler rollers to said advancing roller.

2. An apparatus for dyeing a carpet comprising
(a) a dye vat, said dye vat being adapted to receive a dyeing liquor,
(b) a structural frame being mounted on and being securely attached to said dye vat and extending below the surface of said dyeing liquor,
(c) an advancing roller being rotatably mounted on said frame, said advancing roller having a knurled surface being adapted to frictionally engage said carpet thereby adapting said advancing roller for advancing said carpet along a path,
(d) an idler roller being rotatably mounted on said frame and disposed from said advancing roller, said idler roller cooperating with said advancing roller to continuously move said carpet through said dyeing liquor, said carpet being completely submerged therein, and
(e) aligning bars being rigidly secured to said structural frame and extending above and below said structural frame, said aligning bars being adapted to position said carpet on said rollers.

3. An apparatus for dyeing a carpet comprising
(a) a dye vat, said dye vat being adapted to receive a dyeing liquor,
(b) a structural frame being mounted on and being securely attached to said dye vat and extending below the surface of said dyeing liquor,
(c) an advancing roller being rotatably mounted on said frame, said advancing roller having a knurled surface being adapted to frictionally engage said carpet thereby adapting said advancing roller for advancing said carpet along the path,
(d) an idler roller being rotatably mounted on said frame and disposed from said advancing roller, said idler roller cooperating with said advancing roller to continuously move said carpet through said dyeing liquor, said carpet being completely submerged therein, and
(e) a plate being mounted on said structural frame and being adapted to guide said carpet from said idler rollers to said advancing roller.

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