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PROCESS FOR DYEING YARNS

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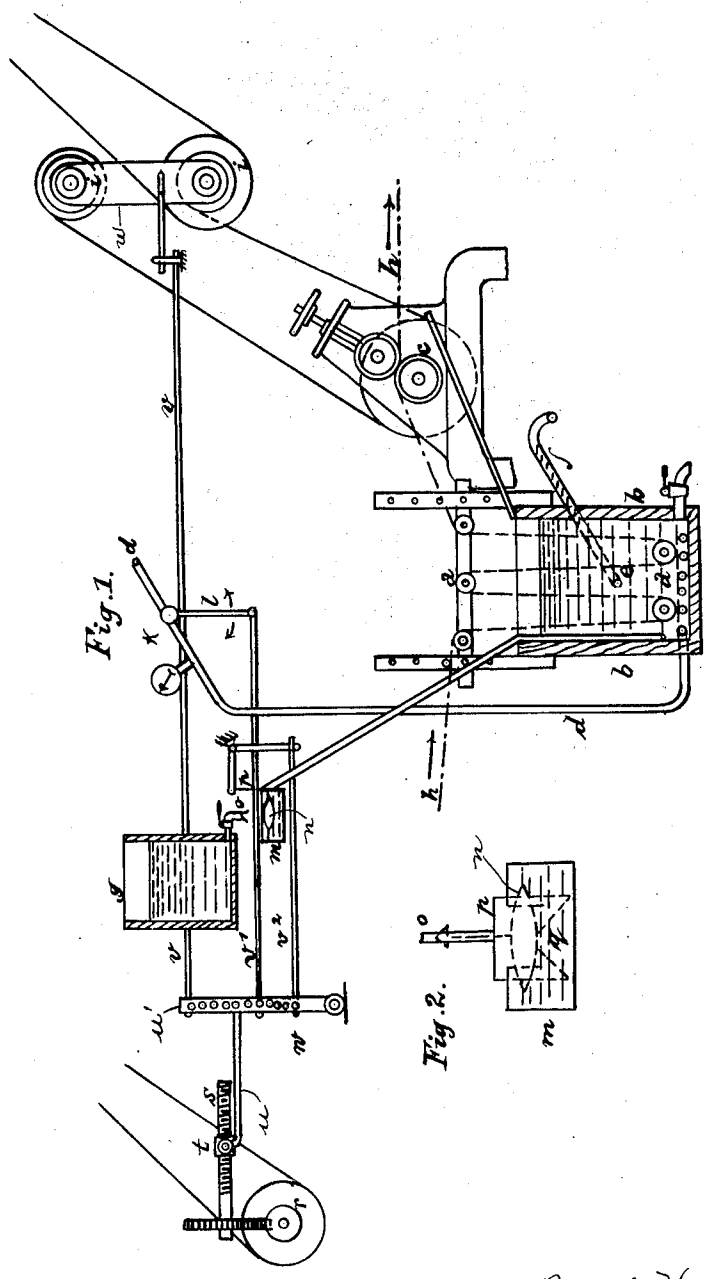


Fig. 1.

Fig. 2.

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HIS ATTYS

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PROCESS FOR DYEING YARNS.

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Heretofore so far as I am aware, it has been customary in so dyeing yarns and similar materials to effect shades of coloring therein to pass the yarns through a dye bath which is gradually increased in strength until the dye bath becomes concentrated, or by gradually decreasing the strength of the dye bath until it becomes substantially exhausted. As will be understood, in the process in which the strength of the dye bath is increased a relatively strong dye bath is finally obtained and which being unutilized is wasted, and likewise in the case of progressively diluting the dye bath there is a resultant waste of the dye material as the strength of the bath is decreased. In the latter instance, for example, if the dye bath at the beginning of an operation is one of 5% strength and is finished with a strength of $\frac{1}{10}$ of 1% solution, relatively large quantities of the coloring material must necessarily be lost.

The object of the present invention is to eliminate the losses to which reference has been made and consists in utilizing a concentrated dye bath at the beginning of the operation, which dye bath is made to correspond to the darkest shades which it is desired to impart to the yarn and by progressively feeding the yarn to or through the bath in such a manner that as the dye is taken up by the yarn the bath becomes exhausted and produces a progressive shading of the yarn from a dark to a light tint. It will be understood that as the rate at which the dye bath becomes exhausted is dependent on the amount of coloring matter employed, on the length of the travel of the yarn through the bath, and also on the speed with which the yarn passes through the bath, as well as on the temperature of the bath, these factors must be taken into consideration in constructing the apparatus by which the process is carried out.

In the drawing Figure 1 is a diagrammatic elevation and partial cross section illustrating an apparatus for carrying out my present invention, and

Fig. 2 is an elevation illustrating the auxiliary tank by which material may be supplied to the dye bath.

By referring to this drawing it will be seen that in carrying out the invention the yarn *h* may be caused to travel over disks *a*, a set of which are arranged at the bottom of the dye vat *b*, and another set adjustably arranged in a frame over or above the dye vat *b* in order that the length of the sections of the yarn passing through the dye vat may be varied. After passing through the dye vat the yarn passes through cylinders *c*, the speed of which determines the rate of travel of the yarn through the vat. The cylinders *c* are preferably driven by means of the belt or otherwise by cone pulleys *i*. These cone pulleys *i* are connected by a belt *w* which may be shifted to control the speed at which the cylinders *c* are driven and to therefore vary the rate of travel of the yarn *h*.

In the bottom of the dye vat *b* there is a coil connected to the steam pipe *d* by which the bath in the vat may be heated and maintained at the desired or necessary temperature for carrying out the process. In this steam pipe *d* there is a valve *k* for controlling the admission of steam to the pipe, and therefore, to the coil within the vat. Suitably connected to the vat there is an overflow pipe *f* which is suitably centered at *e* so as to assume various positions and to control and to maintain any necessary predetermined level of the dye bath within the vat.

I also employ a supply vessel *g* associated with which there is an auxiliary supply vessel *m*. In the auxiliary supply vessel *m* there is a float *n* which carries a conical closing device or valve *o* adapted to control the outlet or discharge from the supply vessel *g* whereby as will be understood, a substantially constant level of the liquid in the auxiliary vessel *m* is maintained. This auxiliary vessel *m* is fitted with a slide *p* having a notch *q* therein which by being raised or lowered controls the discharge from the auxiliary vessel, which discharge is adapted to be conveyed to the dye vat *b* by a suitable pipe as indicated in the drawing. It will be understood that the quantity of the discharge from the auxiliary vessel depends upon the height to which the slide *p* is raised and the resultant extent to which the notch *q* is uncovered.

The apparatus as illustrated is one in which provision is made for simultaneously adjusting the rate of travel of the yarn, the admission of steam to the coil in the vat, and also the admission of the liquid to the dye vat. For this purpose as illustrated, the apparatus includes a screw *s* suitably journaled so as to be turned by gears *r*. On this screw *s* there is a traveling nut *t*. The nut

t is connected by a lever u to a swinging frame u'. A bar v is detachably connected at one end to the frame u' and at the other end is adapted to actuate a belt shifter for changing the position of the belt w on the cone pulleys i. A bar v' is also removably connected at one end with the frame u' and at the opposite end with the lever l which operates and controls the steam valve k. In a similar manner a bar v^2 is detachably connected at one end in the frame u' and at the opposite end with a lever for raising and lowering the slide p. It will be understood, of course, that any one, two or three of these connections may be used at one and the same time.

In the use of this apparatus the dye vat b is filled to a predetermined height with a dye bath which preferably at the beginning of the operation is made to correspond with the darkest tint which is to be imparted to the yarn. As the yarn passes through the bath the dye is taken up thereby and the bath gradually becomes exhausted thereby causing the yarn to be tinted with a shade which becomes continually lighter in color until the tint is varied to the desired extent. Then as will be understood, the bath may be replenished from the supply vessel g through the auxiliary vessel m with the same or another color which may be progressively supplied thereto to effect a varied tint. Obviously, the apparatus may be used in other manners in which the invention may be practiced by varying the tint imparted to the yarn or other articles without wasting the coloring material used in the dye vat and at the same time varying the tint imparted to the yarn.

I claim as my invention:

1. A process for dyeing yarn and like goods to produce various shades of coloring therein, consisting in uniformly passing the yarn through a dye bath in which the strength of the bath is progressively changed by the absorption of the coloring material by the yarn to effect different tints in the yarn.

2. A process for dyeing yarn and like goods to produce various shades of coloring therein, consisting in preparing a dye bath of the darkest shade to be imparted to the yarn, and passing the yarn through the bath whereby as the dye is taken up by the yarn the bath gradually becomes exhausted and effects a gradual shading of the yarn from a dark to a lighter tint.

3. A process for dyeing yarn and like goods to produce various shades of coloring therein, consisting in preparing a dye bath of the darkest shade to be imparted to the yarn, and passing the yarn at a uniformly changing rate of speed through the bath whereby as the dye is taken up by the yarn the bath becomes gradually exhausted and the tint imparted to the yarn correspondingly changed.

4. A process for dyeing yarn and like goods to produce various shades of coloring therein, consisting in preparing a dye bath of the darkest shade to be imparted to the yarn, and passing the yarn at a uniformly changing speed through the bath and maintaining the bath at a predetermined temperature whereby as the dye is taken up by the yarn the bath becomes gradually exhausted and effects a corresponding change in the tint of the yarn.

In testimony, that I claim the foregoing as my invention I have signed my name this twenty first day of July 1924.

OSWALD HOFFMANN.