This invention relates to the method and apparatus of scouring and dyeing or otherwise treating textile fabric on a dye-jig type of dyeing apparatus in which there is improved means for removal of oil and soil marks and that also reduces the length of treatment.

An object of the invention is the economic and expeditious scouring and dyeing of textile fabrics on a device of the dye-jig type. Other objects of the invention will appear from the following detailed description and drawing.

In the drawing:

Fig. 1 is an end view partly in section of the improved dye-jig type of device.

Fig. 2 is a plan view of the improved dye-jig type of device.

By employing this invention soiled fabrics may be successfully scoured clean and dyed which could not formerly be cleaned without the aid of boiling baths containing cleansing agents that were detrimental to the lustre and quality of the fabric. By this invention surface oil and soil marks are expeditiously removed without applying to the fabric reagents that might act as saponifying agents and other like reagents. Further there is no handling from one device, such as a washer to another device such as a dyeing jig, of wet material readily susceptible to injury. The subsequent dyeing and washing treatments can be carried out considerably faster than normal as the method is one in which the liquids are forced through the fabric thus assisting in removing foreign matter and also assisting penetration and deposition of the dye-stuff particles. According to this invention the conventional type dye-jig is employed that has been improved by replacing one of the top immersion rollers with a straight slotted or perforated header, tube or similar device, the slotted tube being connected to a force pump that may be connected by a supply line from the bottom of the dye-jig or from some other source of liquid supply. According to this invention liquid, either the dye-bath or washing bath or a combination of these, are forced into and through the fabric just prior or concurrently to its submersion into the bath.

By this treatment the fabric is thoroughly penetrated and freed from entrapped gaseous bubbles. The minute pockets containing air or other non-textile materials are opened up and made subject to the treatment with the bath. Solid particles of foreign matter are forced out of the material leaving the same clean and uncovered to receive the treatment of the bath.

In the device the intake line to the pump is connected to the drain line of the jig, the liquors passing through a cleaning basket or filter and then being pumped into the slotted slotted tube, which takes the place of one of the top immersion rollers, the liquor then passing through the fabric. The liquor has a cushioning effect between the tube and the fabric which prevents any difficulties due to friction.

In general practice it is preferable to keep the level of the liquor in the jig above the top of the tube or above the slots in the tube, as this prevents foaming of the liquors, which gives rise to disadvantages such as foaming over onto the floor and outside parts of the device and which hinders the possibility of watching either the material being treated or the state of the treating liquors.

This invention is applicable to fabrics that are woven, warp knitted, circular knitted, netted, knotted or otherwise formed from yarns, filaments or fibers of any type of materials such as cotton, reconstituted cellulose (viscose or cuprammonium), wool, flax, silk or other textile materials. It is particularly applicable to fabrics formed from artificial yarns, filaments or staple fibers containing organic derivatives of cellulose such as the organic ethers and esters of cellulose, that may be distorted, creased, changed in luster or otherwise injured by prolonged or drastic treatment in certain types of baths. It is often desired to treat such materials in baths thoroughly and evenly without prolonging the treatment, which treatments may be expeditiously accomplished by this invention. Examples of organic esters of cellulose are cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, while examples of organic cellulose ethers are methyl cellulose, ethyl cellulose, butyl cellulose and benzyl cellulose.

The parts of the apparatus contacted by the treating liquor, such as soap solutions, acid baths, alkaline baths, dye baths, delusterizing baths or other solutions and mixture of solutions or emulsions used in textile processes, may be formed of suitable material selected for their resistance to the liquors intended to be used. Thus the tank and pipes or conduits may be of steel, stainless steel, chromium plated metals, stone, ceramic ware, enameled ware, resins, rubber, or other suitable materials. The selection of the particular materials used is within the skill of a person skilled in the art.

Figure 1 which is a sectional end view of a device constructed according to this invention.
shows a conventional type jig consisting of a frame 11 supporting a tank 12 formed by stone, wood or metal walls 13. In the bottom of the tank is a guide roller 14 that may be journaled in suitable bearings in the ends of the tank or it may be a floating weighted roller. The frame 11 carries standards 15 and 16 adapted to receive respectively a take-up roll 17 and a feed roll 18. There is mounted in the tank 12 a submerging guide roll 19. On the feed roll side of the tank at about the liquid surface line is mounted a member 21 that acts as a distributor head and may be of any suitable shape. This distributor head has a slotted face 22 over which material being treated will pass.

The distributor head is connected to a pump 23 by means of suitable ducts 24. The pump may be of any suitable type and driven by any suitable means such as an electric motor 25. The intake of the pump is connected by suitable ducts 26 to the drain 27 of the tank. Interposed in the line 26 is a filter 27 to prevent threads or other large particles from reaching the slots in the distributor head where they would probably cause clogging.

In operation a roll 18 of fabric 31 is placed on the standard 16. The fabric is then threaded over the header 21 and slots 22, around the guide roll 14, over the submerging roll 19 and on to the take-up roll 17 on standard 15. The pump 23 is operated forcing liquid from the tank 12 through the slots 22 and through the fabric while the fabric is drawn through the bath and wound up on the take-up roll 17.

Obviously many modifications may be made from the specific structure disclosed. For example, provision may be made for continuously discharging spent liquor from the system while taking in fresh or rectified liquor through line 34, thereby contacting the fabric with a penetrating current of fresh reagents at its submersion into the bath. Further the roll 19 may also be replaced by a header supplying the same liquid as header 21 or a different liquid. Obviously any type motor and pump may be employed and their position, relative to the tank, changed or one motor and pump may be employed to operate several baths.

The pump may be such that a controlled and varying pressure of liquid may be forced from the header. Further the slot in the header may be varied in size such that merely a directional current of liquid is set up or preferably a forcefully projected penetrating current is set up that will be injected into and through the fabric being treated.

Having described my invention what I desire to secure by Letters Patent is:

1. Method of treating textile fabrics with a liquid bath, which comprises injecting the liquid of the bath into and through the fabric at the moment that the fabric is submerged in the bath.

2. Method of treating textile fabrics containing organic derivatives of cellulose with a liquid bath, which comprises injecting the liquid of the bath into and through the fabric at the moment that the fabric is submerged in the bath.

3. Method of treating textile fabrics containing cellulose acetate with a liquid bath, which comprises injecting the liquid of the bath into and through the fabric at the moment that the fabric is submerged in the bath.

4. Method of scouring textile fabrics containing organic derivatives of cellulose with a liquid bath, which comprises injecting the liquid of the bath into and through the fabric at the moment that the fabric is submerged in the bath.

5. Method of scouring textile fabrics containing cellulose acetate with a liquid bath, which comprises injecting the liquid of the bath into and through the fabric at the moment that the fabric is submerged in the bath.

6. Apparatus for treating textile fabrics with a liquid, comprising a tank for the liquid, means for guiding the fabric through the tank and means for applying liquid under pressure onto the fabric, the construction and arrangement being such that liquid applying means is positioned substantially at the point where the fabric is submerged in the liquid in the tank.

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