June 17, 1930. C. S. BEDFORD 1,763,945

DYEING, AND LIKE MACHINE

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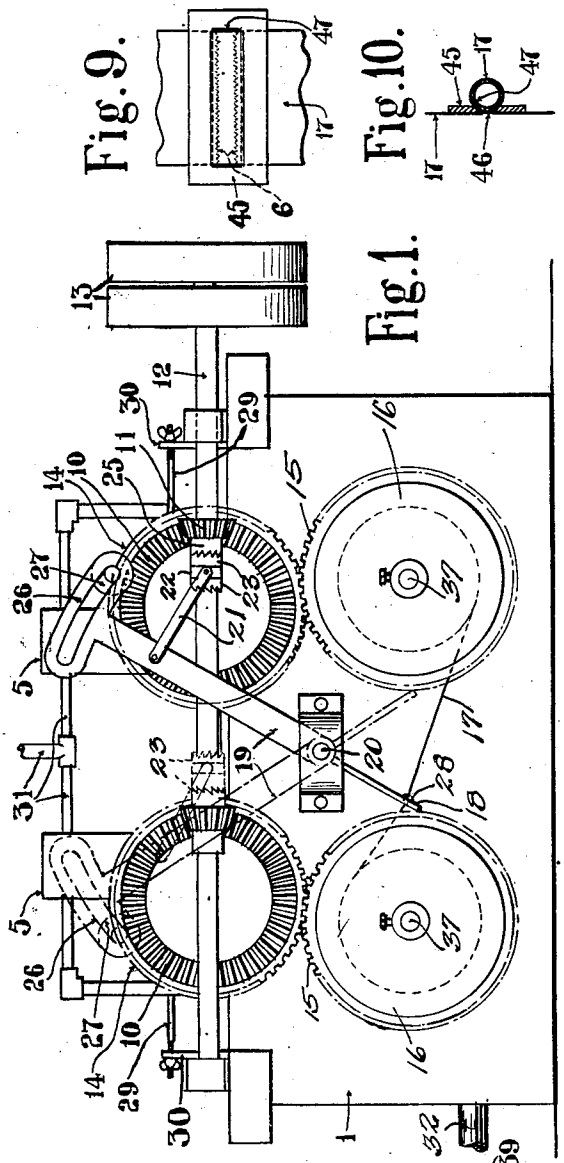


Fig. 1.

Fig. 9.

Fig. 10.

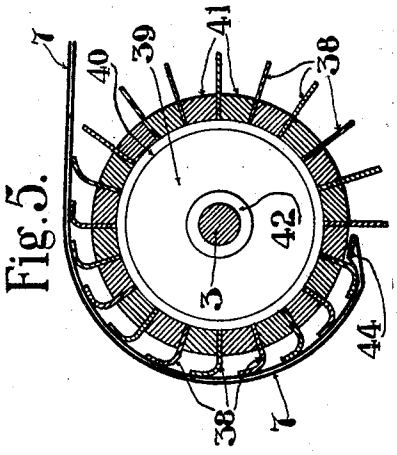


Fig. 5.

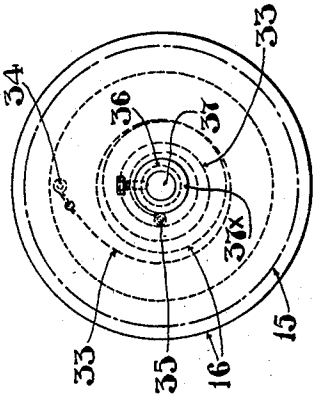


Fig. 4.

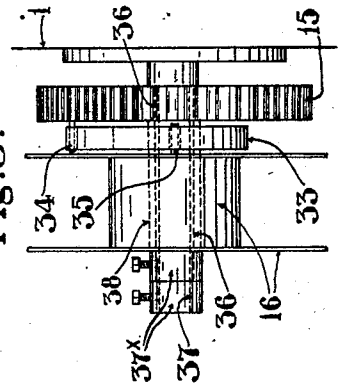


Fig. 3.

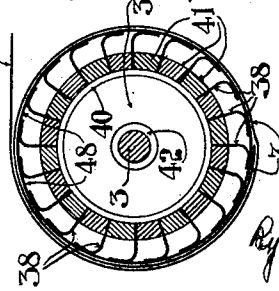


Fig. 8.

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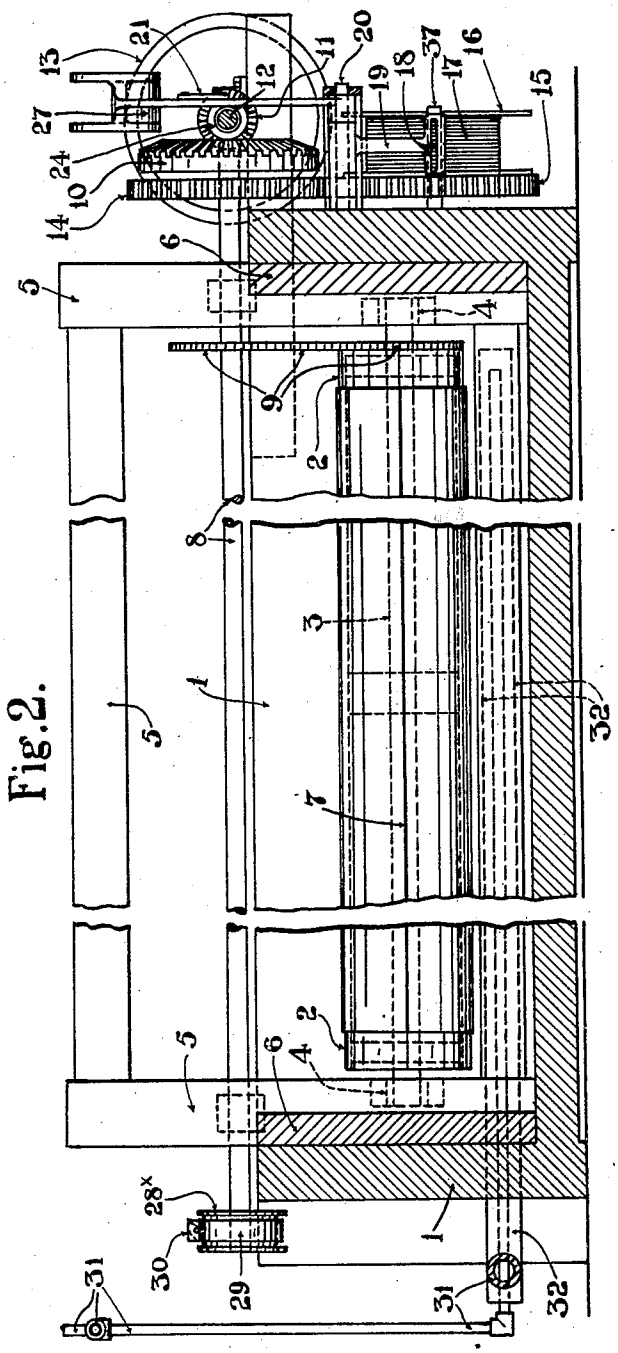


Fig. 2.

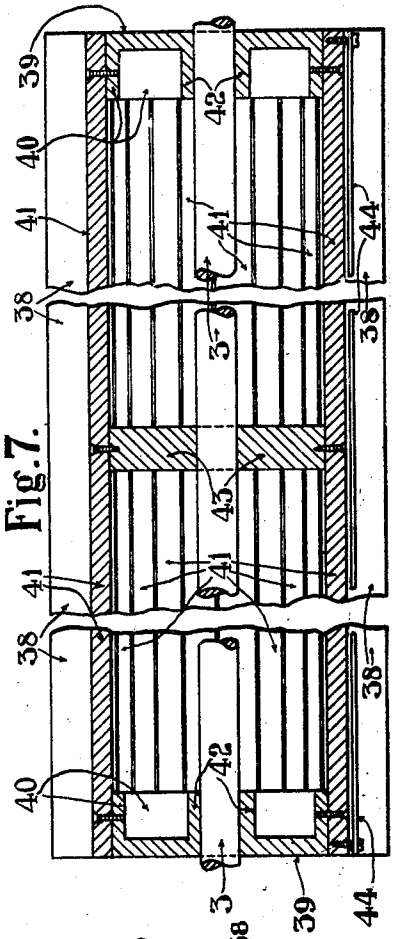


Fig. 7.

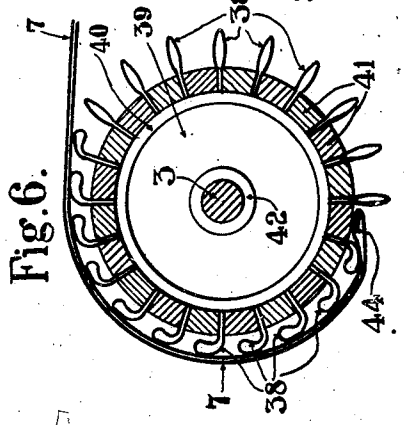


Fig. 6.

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DYEING AND LIKE MACHINE

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Fig.11.

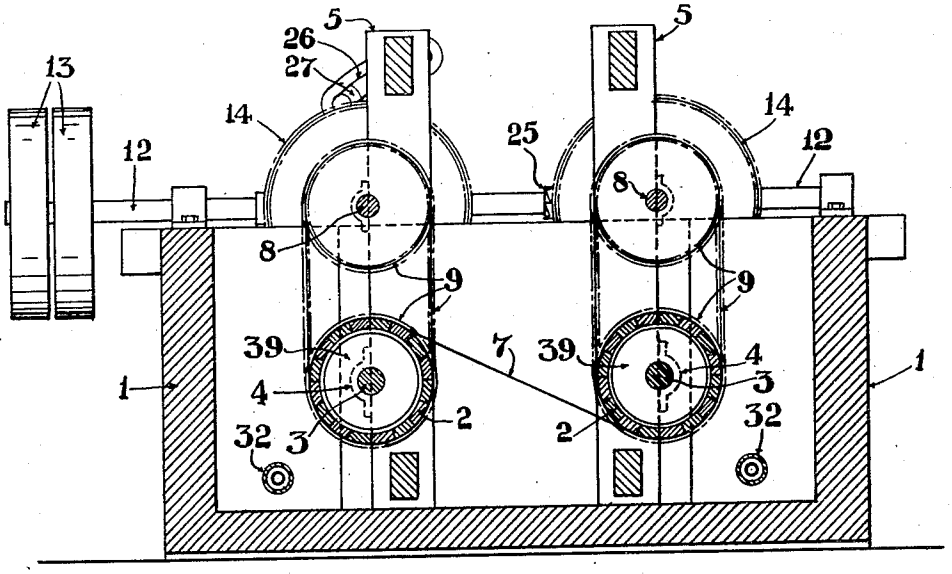
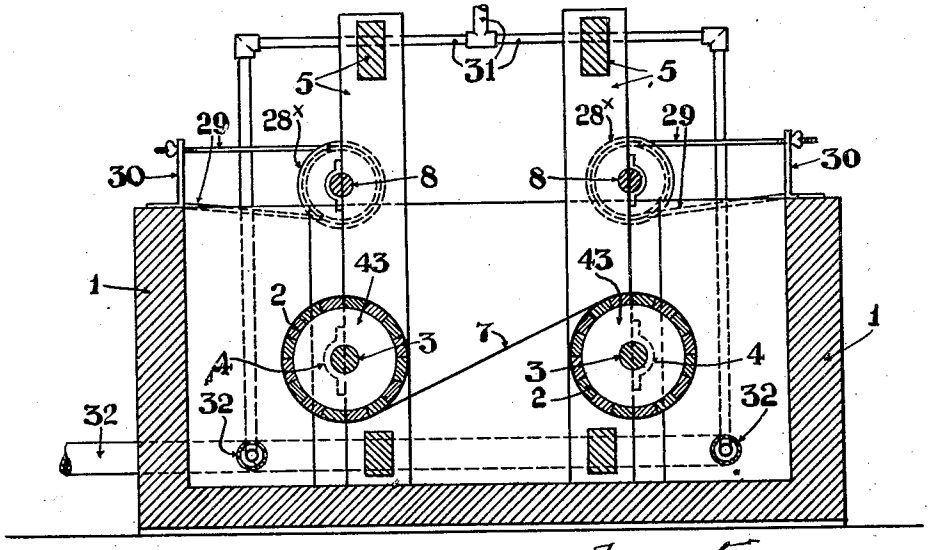


Fig.12.



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UNITED STATES PATENT OFFICE

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DYEING AND LIKE MACHINE

Application filed December 20, 1928, Serial No. 327,381, and in Great Britain December 31, 1927.

This invention relates to dyeing, mordanting scouring and like machines, the chief object being to provide a new or improved machine more particularly though not exclusively, for use in the treatment of light fabrics such as natural or artificial silk materials, cotton piece fabrics and mixtures of cotton or wool or both with natural or artificial silk, such machine being of the type comprising a dye vat or trough containing a pair of winding rollers for the material under treatment, automatic sliding clutch mechanism being provided whereby when the material has been wound from one roller to the other the drive is reversed and the material wound back on to the first roller and so on until the material has been subjected to sufficient treatment.

According to the invention, the alternately driven rollers and fabric are almost or totally submerged in the dye or other liquor in the vat or trough and the automatic reversing sliding clutch mechanism is adapted to be operated by a pivoted lever actuated by a cord or tape passed between winding barrels geared to the winding rollers in the trough or vat.

It has been found that when the machine is being used successively for different styles of fabric the tape, cord or wire is liable to get out of order owing to the variation in tension of the fabric or material, and should the tape, cord or wire become slack it is liable to become entangled with the gearing. Also, when as is customary several pieces of material are joined together the length of the fabric may attain as much as 600 yards, in which case it is desirable that the length of tape be maintained within practical limits.

With a view to preventing or taking up slackness of the tape, cord or wire, thereby ensuring a more perfect reliability in action, I interpose resilient means between the gear wheels and the winding barrels associated therewith in order to obtain latitude of movement so that the tape, cord or wire is maintained at an even tension whichever way the fabric is running. Thus a coiled spring may be mounted between the gears and winding barrels with the extremities of said spring connected to the gears and winding barrels respectively, whilst the gearing from the winding barrels to the rollers may comprise a train of wheels to effect the requisite reduction in speed of the winding barrels. In order to prevent or at least minimize damage to light fabrics such as natural or artificial silk material, cotton piece fabrics, and mixtures of cotton or wool or both with natural or artificial silk the alternately driven winding rollers, which are almost or totally submerged in the dye or other liquor in the vat or trough, are adapted to afford to the fabric being wound thereon a resilient surface which ensures of the fabric being wound evenly without folding or creasing and consequent cutting or damaging or uneven treatment by the dyeing or other liquor.

In order that the invention may be clearly understood and readily carried into effect, the same will now be more fully described with reference to and by the aid of the accompanying drawings. wherein:—

Figure 1 is a front end elevation of the machine and Figure 2 is a sectional side elevation thereof.

Figure 3 is an elevation showing how the spring is mounted between the gears and bobbins.

Figure 4 is an end view of Figure 3.

Figure 5 is a sectional end elevation of a roller according to one embodiment.

Figure 6 is a similar view to Figure 5 but illustrates a modification.

Figure 7 is a longitudinal section of a roller embodying the invention.

Figure 8 is a sectional end elevation of a further modification of roller.

Figures 9 and 10 are respectively an elevation and a section of a slide grip.

Figure 11 is a transverse vertical section through the machine, looking in the opposite direction from the end elevation shown in Figure 1.

Figure 12 is a view similar to Figure 11, but looking in the opposite direction.

Referring to Figures 1 and 2 of the drawings, the machine comprises a vat or trough 1, containing a pair of winding rollers 2

mounted upon tubular or other shafts 3 carried in bearings 4 secured to vertical members of frames 5 adapted to be slid into position within the vat or trough 1 between vertical guides 6, said rollers 2 being almost or totally submerged in the dye or other liquor (not shown) and carrying between them the material 7 under treatment in full or open width. Each of the frames 5 carries above its roller 2 and the top of the trough or vat 1 a longitudinal shaft 8, and the roller shaft 3 is geared to said shaft 8 through chain and sprocket gearing 9, which may be made of stainless steel or phosphor bronze. Each of the shafts 8 carry at its front ends beyond the frames 5 a bevel spur wheel 10 meshing with a bevel pinion 11 rotatable on a transversely disposed transmission shaft 12 provided at one end with fast and loose pulleys 13. The forward ends of the shafts 8, also have mounted thereon spur wheels 14 which mesh with spur wheels 15 fixed to winding barrels 16 rotatably mounted on the front end of the trough or vat 1, and such winding barrels 16 carry between them a cord or tape 17 which passes through an eye 18 at the lower end of a double ended lever 19 pivoted at 20 to the front wall of the trough or vat 1. The upper end or arm of the lever 19 is pivotally connected by a link 21 to a collar 22 slidable with a sleeve 23 which is itself slidably secured to the transmission shaft 12 so as to rotate therewith, and said sleeve 23 carries at each end a dog clutch 24 adapted to engage one or other of dogs 25 associated with the pair of bevel pinions 11. The upper end of the double ended lever 19 is weighted or formed with a transverse arcuate slot 26 within which a rotatable or rolling weight 27 is freely mounted.

The tape or cord 17 passing between the winding barrels 16 has secured thereto a pair of buttons or their equivalent 28 (one only of which is shown), said buttons or the like 28 being adjustable according to the length of the piece or material and so distanced apart on the tape or cord 17 that, when the material 7 has been almost unwound from one of the rollers 2, one of said buttons 28 by the winding of said tape or cord 17, engages the lever 19 and rocks it over as indicated in Figure 1. In lieu of employing buttons on the tape or cord, I may employ grips 45 such as the one illustrated in Figures 9 and 10, said slide grip 45 comprising a metal plate having a serrated or toothed slot 46 formed therein with the underside of the teeth bevelled or inclined as shown to afford a seating for a rod or tube 47 around which the tape or cord 17 passes. In order to fix the slide grip in any predetermined position on the tape or cord 17, the latter is looped or doubled and the looped or doubled portion passes through the serrated or toothed slot 46, whereupon the rod or tube 47 is inserted in the loop and the tape or cord 17 pulled tight. When the tape 17 is running and the slide grip 45 arrives at the slot 18 in the lever 19, it cannot pass through and therefore rocks said lever 19 over into the opposite position. The rocking over of the lever 19 has the effect of pulling or pushing the sleeve 23 along the transmission shaft 12 so as to disengage one of the dog clutches 24 from the dog 25 associated with its adjacent bevel pinion 11 and bring the other or opposite dog clutch 24 into gear with the dog 25 associated with the other bevel pinion 11, thereby reversing the drive to the rollers 2 and causing the material 7 to be wound back on to the roller 2 from which it has just been unwound. It will be observed that only one roller at a time is driven by the shaft 12, namely, that upon which the fabric is being wound, the other roller and its associated gearing being driven by tension of the cloth only. The duty of the cord or tape is simply to control the "knock off". It takes no part in winding the fabric. During the rocking of the lever 19, the rolling weight 27 travels from one end to the other of the arcuate slot 26 and serves to retain the lever 19 in position and the appropriate dog clutch 24 in gear until the said lever 19 is again rocked about its pivot 20. A fixed weight or gravity bob may be used to perform the same service.

For the purpose of preventing slack winding or over-running of the material 7 and for regulating the tension thereof, the rear ends of the shafts 8 are fitted with brake drums 28^{x} having adjustable brake bands or straps 29 connected to brackets 30 on the sides of the trough or vat 1.

The dye or other liquid in the trough or vat 1 is adapted to be heated by steam supplied by way of a pipe system 31 leading into larger copper or other pipes 32 running longitudinally of the trough or vat 1 and constituting a return for the products of condensation.

Referring now to Figures 3 and 4 of the drawings, 15 represents the first wheel of the train of gears and 16 the winding barrel associated therewith, whilst 33 indicates the resilient means in the form of a spring mounted between the gears 15 and winding barrels 16, see Figure 3. The outer end of the spring 33 is attached to the gear wheel 15 at 34, whilst the inner end is secured to the winding barrel 16 at 35. The arrangement will be such that the spring may be readily removed and replaced, thus allowing for different strengths of springs being used according to the nature of the fabric or material being treated. The fabric or material is kept moving on the rollers during the whole operation, one roller acting as the drawing roller and the other as the

drawing roller and the other as the drawn roller alternately, the tension of the brake on the rollers being so arranged that only the drawn roller for the time being shall be subject to the action of the brake and the drawing roller being free from such restraint. Thus, the brake drums 28ˣ may be carried upon free wheel devices in such a manner that when the roller is acting as a drawing roller the brake drum 28ˣ is free to revolve on the shaft 8, whilst when acting as a drawn roller the brake drum 28ˣ will be locked to the shaft. A brake strap 29 may be fixed over the drum and an adjustable pendant weight provided to regulate the required friction.

The gears 15 of the train of gears associated with the batch rollers are mounted on sleeves 36 revolving on pins or studs 37, whilst the winding barrels 16 revolve on sleeves 38 fitting over the sleeves 36. The gears 15 and winding barrels 16 are held together by lock rings 37ˣ, whilst the only connection between the gears 15 and winding barrels 16 is the spring 33. It is necessary in order to obtain smooth running that the fabric should be entirely responsible for actuating the drawn roller, receiving no assistance from the rope or cord, the only function of which is to determine the length of traverse between the stops.

Referring to Figures 5, 6 and 7 of the drawings, the winding surfaces of the rollers 2 are afforded by longitudinally disposed and radially projecting resilient members 38 which give or bend under the tension of the material 7 being wound thereon, as indicated in Figures 5 and 6. The rollers 2 comprise brass or other metal end plates 39 formed with peripheral flanges 40 which carry between them wooden or other staves or laths 41. The end plates 39 are formed with centrally disposed bosses 42 whereby the roller 2 as a whole is mounted on the shaft 3, whilst one or more wooden or other discs 43 intermediate of the end plates 39 and mounted on the shaft 3 serve to support the staves or laths 41. The longitudinally disposed and radially projecting resilient members 38 are made of rubber or other appropriate resilient material and are supported in position by having their inner edges secured between the adjacent longitudinal staves or laths 41. In the embodiment shown at Figure 5, the resilient members 38 are in the form of single strips, whilst in Figure 6, the resilient members 38 are in the form of looped or folded strips, the two edges of each strip 38 being secured between adjacent staves or laths 41 and the outer or looped portion presenting a rounded or curved surface to the material 7.

The end of the material 7 may be attached to the roller in any appropriate manner such, for instance, as by means of a clamping or securing bar 44 bolted or otherwise secured to one of the staves or laths 41.

It is evident that the resilient members can be in continuous strips along the whole length of the roller, or the continuity may be broken at intervals and the tongues thus formed may be regularly spaced. The intervals of successive lines may be stepped so that the space of one line is occupied by a tongue in the next continuously round the roller. An improvement on this resilient roller consists as shown in Figure 8, in overlaying the projecting resilient strips 38 by a soft india-rubber sleeve 48 which by enclosing and slightly compressing the resilient strips 38, increases the effect as a resilient roller, giving an even surface upon which to wind the fabric.

With a machine as above described, the treatment of tender or light materials in open width can be attained without subjecting them to any considerable tension such as obtains when such pieces are dyed over a winch. It is found that light fabrics are much less prone to crease when wound upon a resilient surface than when a hard roller is employed. Moreover, the fabric not being under severe strain, any creases which may form are not severe and are easily removed in the subsequent tentering. Moreover, the machine enables a small quantity of concentrated or other liquor to be used for the treatment of a comparatively large amount of material, while such treatment being conducted almost or entirely under the surface of the liquor tends to conserve heat and in consequence the utilization of steam is greatly reduced. Further, surface oxidation is largely eliminated and the utilization of heating elements in a machine as above described enables an actual boiling temperature to be attained.

A further advantage arising from employment of machines as above described is that either of the rollers upon which the material is wound may be readily removed in its frame and transferred to another machine of similar type for subsequent treatment, thus two machines may be employed, one for the mordanting process and the other for the dyeing operation.

I claim:—

1. A dyeing or like machine of the type specified, comprising in combination a vat for the dye, alternately driven winding rollers in the vat, and adapted to be submerged in the dye therein, winding barrels geared to the winding rollers, a tape carried between the winding barrels, sliding clutch mechanism for reversing the drive of the winding rollers, and a pivoted lever adapted to operate said clutch mechanism and to be actuated by said tape.

2. A dyeing or like machine of the type

specified, comprising in combination a vat for the dye, alternately driven winding rollers in the vat in position to be submerged in the dye therein, winding barrels geared to the winding rollers, frames in which said winding rollers and associated gearing are mounted, guides in the vat for receiving said frames, a tape carried between the winding barrels, sliding clutch mechanism for reversing the drive of the winding rollers, and a pivoted lever adapted to operate said clutch mechanism and be actuated by said tape.

3. A dyeing or like machine of the type specified, comprising in combination a vat for the dye, alternately driven winding rollers in the vat, in position to be submerged in the dye therein, braking mechanism associated with the winding rollers, winding barrels geared to the winding rollers, a tape carried between the winding barrels, sliding clutch mechanism for reversing the drive of the winding rollers, and a pivoted lever adapted to operate said clutch mechanism and be actuated by said tape.

4. A dyeing or like machine of the type specified, comprising in combination a vat for the dye, a steam supply system in the vat for heating the dye, alternately driven winding rollers in the vat, in position to be submerged in the dye therein, winding barrels geared to the winding rollers, a tape carried between the winding barrels, sliding clutch mechanism for reversing the drive of the winding rollers, and a pivoted lever adapted to operate said clutch mechanism and be actuated by said tape.

5. A dyeing or like machine of the type specified, comprising in combination a vat for the dye, alternately driven winding rollers in the vat, in position to be submerged in the dye therein, winding barrels, a gear associated with each winding barrel and geared to the winding rollers, resilient means between each of the winding barrels and said gear, a tape carried between the winding barrels, sliding clutch mechanism for reversing the drive of the winding rollers, and a pivoted lever adapted to operate said clutch mechanism and be actuated by said tape.

6. A dyeing or like machine of the type specified, comprising in combination a vat for the dye, alternately driven winding rollers in the vat, in position to be submerged in the dye therein, winding barrels, gearing connecting the winding barrels and the winding rollers, a coiled spring between the winding barrels and said gearing, a tape carried between the winding barrels, sliding clutch mechanism for reversing the drive of the winding rollers, and a pivoted lever adapted to operate said clutch mechanism and be actuated by said tape.

7. A dyeing or like machine of the type specified, comprising in combination a vat for the dye, alternately driven winding rollers in the vat, in position to be submerged in the dye therein, a resilient winding surface on each winding roller, winding barrels geared to the winding rollers, a tape carried between the winding barrels, sliding clutch mechanism for reversing the drive of the winding rollers, and a pivoted lever adapted to operate said clutch mechanism and be actuated by said tape.

8. A dyeing or like machine of the type specified, comprising in combination a vat for the dye, alternately driven winding rollers in the vat, in position to be submerged in the dye therein, longitudinally disposed and radially projecting resilient members on each winding roller, winding barrels geared to the winding rollers, a tape carried between the winding barrels, sliding clutch mechanism for reversing the drive of the winding rollers, and a pivoted lever adapted to operate said clutch mechanism and be actuated by said tape.

9. A dyeing or like machine of the type specified, comprising in combination a vat for the dye, alternately driven winding rollers in the vat, in position to be submerged in the dye therein, longitudinally disposed and radially projecting resilient members on each winding roller, a resilient sleeve enclosing the longitudinally disposed and radially projecting resilient members of each winding roller, winding barrels geared to the winding rollers, a tape carried between the winding barrels, sliding clutch mechanism for reversing the drive of the winding rollers, and a pivoted lever adapted to operate said clutch mechanism and be actuated by said tape.

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