No. 854,417. PATENTED MAY 21, 1907.

J. R. GREENWOOD.

DYEING MACHINE.

APPLICATION FILED SEPT. 26, 1906.

2 SHEETS—SHEET 1.

Fig. 2

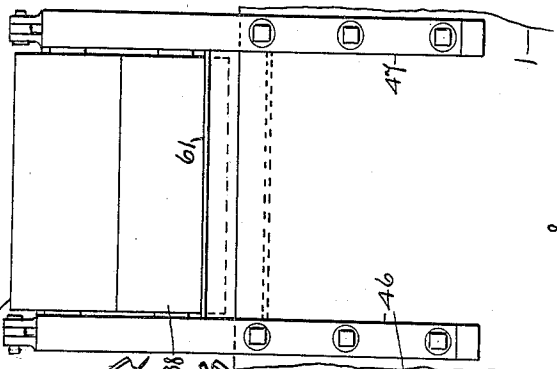


Fig. 5

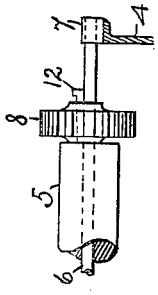
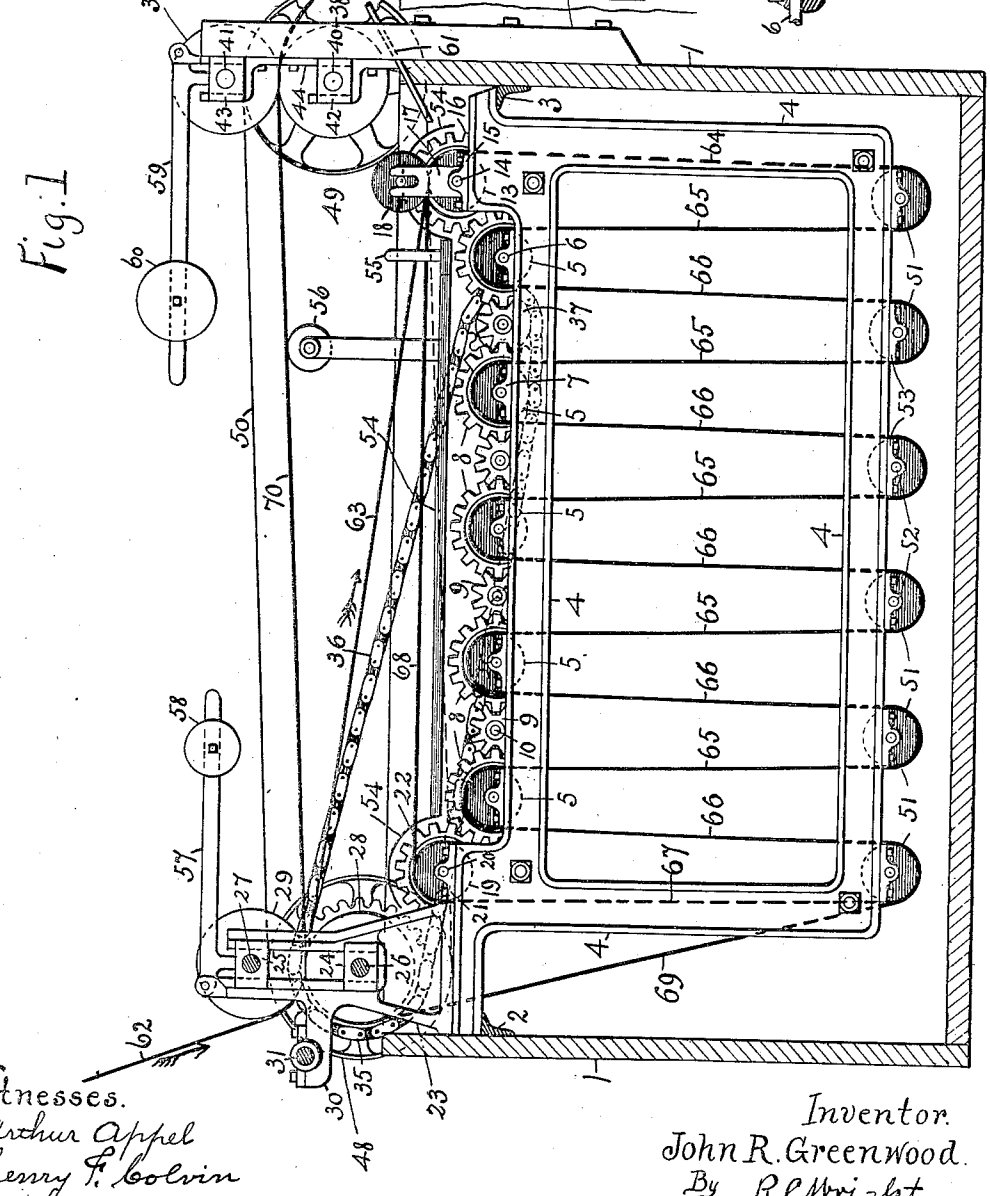


Fig. 1



Witnesses.
Arthur Appel
Henry F. Colvin

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John R. Greenwood.
By R. C. Wright Atty.

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Fig. 4

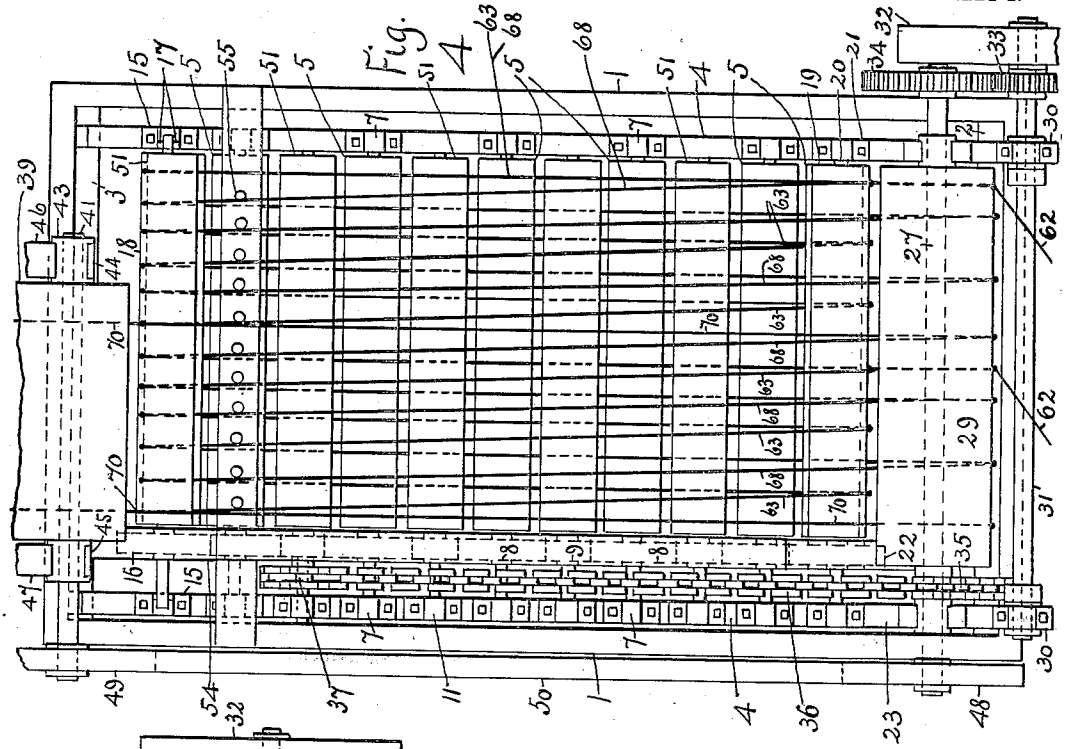
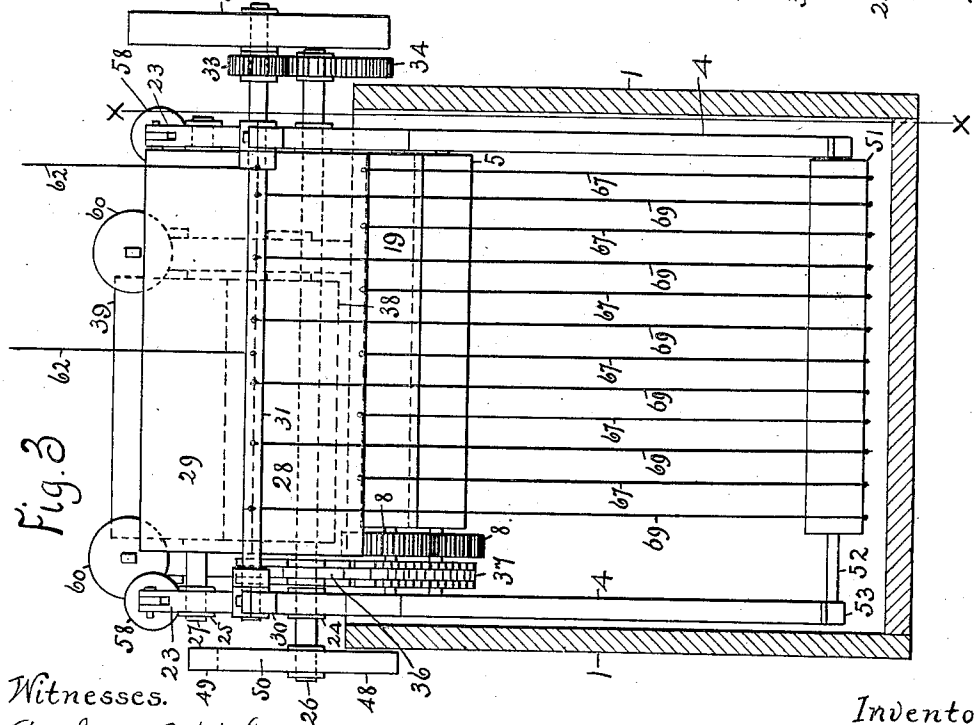


Fig. 3



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UNITED STATES PATENT OFFICE.

JOHN R. GREENWOOD, OF BOOTHWYN, PENNSYLVANIA.

DYEING-MACHINE.

No. 854,417. Specification of Letters Patent. Patented May 21, 1907.

Application filed September 26, 1906. Serial No. 336,226.

To all whom it may concern:

Be it known that I, JOHN R. GREENWOOD, a citizen of the United States, residing at Boothwyn, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Dyeing-Machines, of which the following is a specification.

This invention relates to machines for dyeing, and equally well adapted for warps or piece goods; among its distinguishing features are the repassing of the material to be dyed through the machine in successive parallel courses, and the separation of the material both vertically and horizontally at each return of the courses, to thereby lessen the liability of its entanglement; also, the positive movement of the material is effected without undue tension upon it (thereby lessening the damage by breakages) by power driven rolls which carry the material and which are positively rotated in unison at uniform surface speeds, by an arrangement of means which control their movements in the directions necessary for the successive passing of the material through the dye until it is evenly and thoroughly colored, which must be done without expressing any dye from the material until its final passage from the machine. The expressing of any dye while the material is passing from one part of the machine to another part, and at a time when it is exposed to atmospheric conditions is detrimental to uniform coloring, and in this machine this heretofore defect has been overcome, most effectually, by the employment of a pair of final squeeze rolls which express the dye when the work is completed and at the time the material passes from the machine to the washery, also the nonpulling of the material through the machine, which insures uniform coloring, as the material is thoroughly dye saturated throughout the process. There is also, in this machine, a saving of a large amount of dye which is returned to the vat by the final squeeze rolls. Where only one pair of squeeze rolls are employed, as in previous machines, and the material must be pulled over non-power driven rolls, the capacity of the machine is limited by the tensile strength of the material going through the machine, and any bunching of the material, knots, etc when forced through the former single pair of squeeze rolls produces uneven pressure and uneven expressing of the dye, resulting in spotting and uneven depth of color. These defects have been overcome by the power driven rolls which carry the material along without undue tension, and the final squeeze rolls which permit full and free saturation until perfect work is assured.

The illustrations show the machine carrying warps, in which

Figure 1 is a side elevation of the machine with the side of the vat and the driving pulley and gears exterior to line x x Fig. 3, removed. Fig. 2 is an elevation view of the final squeeze rolls. Fig. 3 is a front elevation of the machine with the vat end removed. Fig. 4 is a top or plan view, with the weights and their levers removed. Fig. 5 is a view of a portion of one of the power driven rolls, its gear and the removable key which secures the gear to the roll shaft.

In a vat or tank 1, upon angle irons 2, 3 a framework 4 is removably supported. Upon the upper horizontal sides of the framework a series of power driven rollers 5 are supported by shafts 6 in bearings 7, the rollers being spaced apart, and each shaft having a gear 8, and intermediate the gears are pinions 9 supported on studs 10 in bearings 11 secured to the framework. The gears 5 are secured to shafts 6 by keys 12 or other suitable means which may be removed so that if desired, to insure an even tension upon the warp, should there be any inequality in the diameter of a roll, or rolls, any desired roll or rolls may be free to be rotated by the contact of the material, instead of being positively driven by the gears.

Beyond the rolls 5 and somewhat above them there is an auxiliary roll 13 at the outer end of the machine, with a shaft 14 and bearings 15 and a gear 16 engaging the gear 8 of the adjacent roller 5. Bearing 15 has upwardly extending bifurcated projections 17 carrying a roller 18 pressing upon the material as it passes over roller 13.

At the inner end of the machine, and above the adjacent roller 5 there is an auxiliary roller 19, with a shaft 20, bearings 21 and a gear 22 engaging a gear 8 of the adjacent roll 5. Mounted above the framework 4 are stands 23 in which are bearings 24, 25 for shafts 26, 27 which support the drawing-in or initial squeeze rollers 28, 29. Upon stands 23 are brackets 30 supporting a shaft 31 upon which is a driving pulley 32 and a pinion 33 engaging a gear 34 on shaft 26 of roll 28. At the opposite end of shaft 26 from pulley

32 there is a sprocket wheel 35 carrying a chain 36 driving another sprocket wheel 37 on a pinion stud 10, and driving a pinion 9, and this is the means for driving the series of rolls 5, and rollers 13, 19, the parts being proportioned so that the surface speeds of rollers 5, 13, 19, 28, are uniform.

At the outer end of the machine, opposite rollers 28, 29 there are placed the final squeeze or drawing-out rollers 38, 39 on shafts 40, 41, in bearings 42, 43 carried in frames 44, 45 on supports 46, 47 secured to vat 1. Upon shaft 26 there is a pulley 48 and upon shaft 40 there is a pulley 49 of the same diameter connected by a belt 50, so that rolls 28, 29 and 39, 40 are driven at a uniform speed. Sprocket wheels and a chain may equally well be used if desired. Thus all the rollers and the initial or drawing-in and final squeeze or drawing-out rollers are positively power driven to carry the warp or material along without any tension being produced upon it.

At the lower part of framework 4 there are placed a series of idle rollers 51 on shafts 52 supported in bearings 53. Above gears 5, 16, 22 and pinions 9 there is a shield 54 to prevent the possible entanglement of the material in the gears. Above the roller 5 adjacent roll 13 there are pin guides 55 to deflect the warp to roller 13. Above shield 54 a roller 56 is placed to prevent the sagging of the outgoing material. Above bearings 25 levers 57 are fulcrumed to stands 23 with projections engaging the bearings, and weights 58 are adjustably mounted to press down roll 29 to give a desired tension to the warp or material, while levers 59 and larger weights 60 are similarly provided for roll 39. A dripper 61 is placed under roll 38 to return the expressed dye into vat 1.

The courses of the warp through the machine are as follows; two warps are shown and their movements are identical, and the number of warps dyed in one operation being only limited by the length of the rolls. The material first enters at 62 and passes between rollers 28, 29 then at 63 to and between the drawing-in rollers 13, 18 then at 64 down to and under the roller 51 at the same end of the machine, then in successive upward courses 65 and downward courses 66 over a roller 5 and under a roller 51 until passing the last roller 51 it goes up at 67 and around roller 19 and at 68 horizontally to and between rollers 13, 18 but being deflected in this movement by guide pins 55 as seen in Fig. 4, to one side of and parallel to its previous course between rollers 13, 18, this is the first course; the second course is parallel to the first course until the last roller 51 is passed, then the warp at 69 passes to and over roller 28, separating the courses of warp or material at 67, 69 at the incoming end of the machine, and also at 63 as it passes to rolls 13, 18, from its previous course 68 to the same rolls, this is the second course; each alternate course is repeated three times, after which the warp passes at 70 to and between the final or drawing-out rolls 38, 39 where it is squeezed dry, the expressed dye returning to the vat, which saves much dye, and facilitates the washing of the material, as there is less dye to be removed.

1. In a dyeing machine, a vat, a framework immersed therein, a pair of initial squeeze or drawing-in rolls, with means for their rotation; a series of power driven rolls with means for their rotation in a direction opposite to the direction of the lower inital or drawing-in roll; and auxiliary rolls adjacent each outer roll of the power driven series, with means for their rotation in a direction opposite to that of the power driven rolls aforesaid.

2. In a dyeing machine, a vat, a framework immersed therein, a pair of initial squeeze or drawing-in rolls, with means for their rotation; a series of power driven rolls with means for their rotation in a direction opposite to the direction of the lower initial or drawing in roll; auxiliary rolls adjacent each outer roll of the power driven series, with means for their rotation in a direction opposite to that of the power driven rolls aforesaid, and a series of idler or carrier rolls located below the power driven rolls.

3. In a dyeing machine, a vat, a framework immersed therein, a pair of initial or drawing-in rolls, with means for their rotation; a series of power driven rolls with means for their rotation; an auxiliary roll between the initial or drawing-in rolls and the power driven rolls, an auxiliary roll at the opposite end of the series of power driven rolls, and a pressure roll mounted above the same for free vertical movement.

4. In a dyeing machine, a vat, a framework immersed therein, a pair of initial or drawing-in rolls, with means for their rotation; a series of power driven rolls with means for their rotation; an auxiliary roll between the initial rolls and the power driven rolls, an auxiliary roll at the opposite end of the series of power driven rolls, a pressure roll mounted above the same for free vertical movement, and a pair of drawing-out or final squeeze rolls above and beyond the auxiliary roll and its pressure roll aforesaid.

5. In a dyeing machine, a vat, and a framework inclosed therein and carrying rolls for the passage of material through dye in the vat aforesaid in multiple return courses, the rolls being arranged in substantially the following manner; an initial squeeze or drawing-in roll with means for its driving by power, a friction driven roll mounted above the aforesaid roll, and means to press it to the aforesaid roll; a series of power driven rolls, and gears therefor, pinions intermediate the aforesaid gears and whereby the rolls are

driven in a unifom direction and oppositely to the direction of the lower initial or drawing-in roll, and means for their driving; an auxiliary roll geared to the roll of the series, nearest the initial roll, and oppositely rotated; an auxiliary roll geared to the roll of the series the most remote from the lower initial or drawing-in roll, and oppositely rotated; a series of lower rolls free to be rotated by the friction of the material engaging them; a lower final or drawing-out roll and means for its driving, a friction driven roll mounted above the lower final roll, and means to press it to the said roll.

6. In a dyeing machine, a vat, a framework, rolls mounted thereon, gears for the rolls, pinions intermediate the gears, and a shield to prevent material becoming entangled in the gears and pinions.

7. In a dyeing machine, a vat, a framework supported therein, rolls mounted substantially as set forth, to pass material in parallel horizontal and vertical courses over and around said rolls, and guides located to deflect the material at the termination of the horizontal courses to parallel positions in the vertical courses.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN R. GREENWOOD.

Witnesses:

LEWIS H. REDNER,

RANSOM C. WRIGHT.