

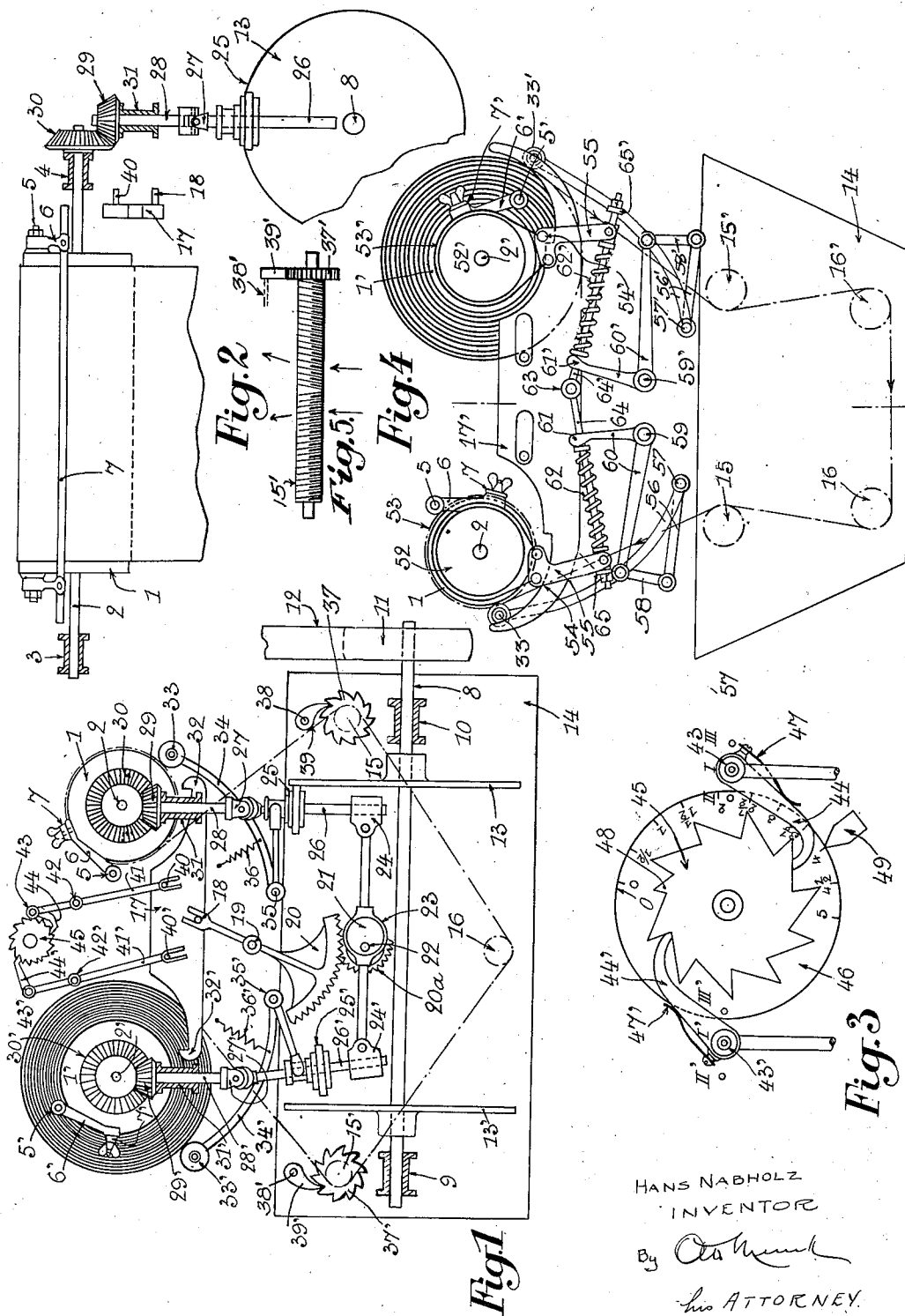
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DYEING MACHINE

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DYEING MACHINE

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In the dyeing machines known heretofore, for dyeing, impregnating, sponging, boiling fabrics in large rolls, provided or not with an automatic reversing mechanism, the driven
5 feed cylinder revolves always at the same angular speed. The speed of the fabric, passing through the dyeing fluid increases therefore as the diameter of the roll of fabric wound up on the driven feed cylinder in-
10 creases. At the same time the angular speed of the other feed cylinder, which is not then positively driven and runs free, increases, so that in case of an automatically reversing machine the reversing takes place when the
15 angular speed is the greatest.

For the success of the dyeing process it is of advantage, that the fabric be dragged through the dyeing fluid at a substantially constant speed, so that all parts of the fabric at each
20 passage through the trough be exposed during the same length of time to the action of the dyeing fluid. Further, when the reversing is automatically performed, it is of importance that the angular speed of the not
25 driven feed cylinder be not too great at the moment of reversing, so that the reversing takes place without a shock and without damaging the fabric.

It is also necessary, for a good dyeing process, that at any moment of the dyeing process, the fabric remains under the same conditions in all its parts, during its passage through the dyeing fluid at a constant speed and that the tension produced in the fabric
35 by the tensioning brake on the not driven feed cylinder, remains always the same. If the brake would be fixed in a certain position for the whole time of the passage of the fabric through the trough, the tension in this fabric
40 would be increasing, as the diameter of the roll would be decreasing. In case the brake is regulated by hand, as it is performed with the known dyeing machine, this regulation is not so exact that the tension of the cloth re-
45 mains exactly the same; further such an operation, when performed by hand, requires the constant care of the operator which means an extra labor expense.

The main object of the present invention
50 is a reversing and driving appliance for dye-

ing jigger-machines in large rolls, which in a simple way, causes the fabric to run at a constant speed through the dyeing fluid, which also indicates for example, by means of a
55 ratchet wheel, controlled by the reversing motion, the desired number of passages of the fabric in both directions through the dyeing fluid, giving for instance a signal to the operator when the necessary number of pas-
60 sages is fulfilled or stopping the machine automatically; said reversing and driving appliance acts on the brakes for the feed cylinder, in such a way that the braking effect is regulated automatically depending on the
65 diameter of the roll.

The appended drawings show diagrammatically an embodiment of the invention:

Fig. 1 is a front view of the reversing appliance and of the trough.

Fig. 2 is a longitudinal view of a feed cylinder with its driving mechanism.

Fig. 3 is a view of the ratchet wheel and pawls for the indicating device.

Fig. 4 is a rear view of the machine showing the brakes and the automatic regulation
75 of same.

Fig. 5 shows the screw-threaded rods or rollers used as a stretching device for the cloth.

1 and 1' are the feed-cylinders; their shafts
80 2 and 2' rotate in the bearings 3 and 4 (Fig. 2). On both ends of each feed cylinder are provided the journals 5 and 5' on which are suspended the swinging levers 6 and 6'; at the other end of the levers 6 the rods 7 and
85 7' are attached in such a way that it is easy to take them off. The rods 7 and 7' are secured in place, after part of the false cloth or of the fabric has been wound upon the feed
90 cylinder, which has to remain wound upon the cylinder during the next dyeing process, with the purpose to keep the false cloth or the fabric attached to the feed cylinders or with the purpose not to pass the whole piece of the
95 fabric through the dyeing bath.

The operation of the machine is as follows: On the countershaft 8, turning in the bearings 9 and 10 and driven by the pulley 11 and the belt 12, are keyed the driving fric-
100 tion wheels 13 and 13'. The fabric, which is

to be dyed, is shown in the drawing wound around the left feed cylinder 1' and its end is guided through the trough 14 over the guiding rollers 15', 16 and 15 to the right feed cylinder 1 and attached to it, and this either by simply winding it over the feed roller or by fixing it by means of a clamping or another similar device. Then the rod 7 is secured to the levers 6 of the right feed cylinder 1 and is pressed to the surface of the latter by the fabric wound upon the cylinder.

The control bar 17, which had been placed in the middle position between the feed cylinders 1 and 1' during the insertion of the fabric into the machine, is moved now to the right and by means of the catch-journal 18 causes the toothed quadrant 20 to rotate to the left on the journal 19 fixed to the frame of the machine. The toothed quadrant 20 causes the quadrant 20^a and the eccentric 21 fixed to it, to rotate around the journal 22 fixed to the frame of the machine, so that the said eccentric brings the shaft-bearings 24 and 27 in their extreme position to the right by means of the eccentric strap 23. Through this, the friction wheel 25 which moves on the vertical shaft 26 by means of a key and a long key-way, is pressed against the friction wheel 13. The shaft 26 begins to rotate, this rotation is transmitted to the conical tooth wheels 29 and 30 by the ball-joint 27 and the vertical shaft 28 and so the right feed cylinder 1 is brought into rotation. The vertical shaft 28 is guided in a long bearing 31. As soon as the fabric and the false cloth have been wound off from the left feed cylinder 1' so far, that the rod 7' is freed, the latter falls upon the control bar 17 and moves it to the left by engagement with the projection 32' on the end of said bar. By this operation the left friction drive 13', 25' is brought into action and begins to wind up the fabric on the left feed cylinder 1', whilst at the same time the right friction drive 13, 25 is uncoupled.

The gauge rollers 33 and 33', which are carried by the angle levers 34 and 34' rotating on the journals 35 and 35', the latter being fixed to the frame of the machine, are pressed against the feed cylinders 1 and 1' by the springs 36 and 36'. Through the increasing of the diameter of the roll and of the distance of the gauge roller from the axis of the feeding cylinders 1 and 1' the friction wheel 25 or 25' is moved on the vertical shaft 26 or 26' in such a way, that the speed of rotation decreases, because the friction wheel 25 or 25' is brought nearer to the countershaft 8. In this way the fabric is caused to travel always with the same speed through the dyeing bath.

As shown in Fig. 5, the guiding rollers 15 and 15' in the trough 14 have on their surfaces screwthreads cut into them, which from the middle point run righthanded and left-

handed towards the ends. The fabric, which is wound off from the feed cylinder 1' and wound on the feed cylinder 1 causes the guiding roller 15' to rotate counterclockwise, whereby the screwthread on the guiding roller 15' has no influence upon the condition of the fabric. The arrows (Fig. 5) show the direction of travel of the fabric which, in the case illustrated, passes under the screw threaded rod or roller 15' and freely rotates the latter. Meanwhile, the right guiding roller 15, whose clockwise rotation is prohibited by a ratchet gear, 37 or similar organ, the pawl 38 of which is in a suitable position as shown in Fig. 1, is not brought into rotation by the fabric, passing over it; it remains motionless and causes the stretching of the fabric running over the diverging screwthreads of its surface, so that the fabric comes upon the feed cylinder 1 without folds and creases. Practically, said gear is preferably of the friction type but, for the sake of clearness, only a plain ratchet gear has been represented and described. On the way back of the fabric from the feed cylinder 1 to the feed cylinder 1' it is the guiding roller 15, which is set into rotation in the clockwise direction in the illustrated case, whilst the left guiding roller 15' remains stopped and causes the desired stretching of the fabric passing over the diverging threads provided on its periphery, as shown.

By moving the control bar 17 the levers 41 and 41' are caused to turn around the journals 42 and 42' fixed to the machine frame by means of the gripper journals 40 and 40'; during this motion the pawls 44 and 44' cause a partial rotation of the ratchet wheel 45 connected with a counting disc 46. The pawls 44 and 44' are pressed against the teeth of the ratchet wheel 45 by the flat springs 47 and 47'. The counting disc 46 (Fig. 3) indicates the number of passages of the fabric through the trough, which remain still to be fulfilled. The ratchet wheel 45 has a number of entire teeth and one half-tooth, that is one tooth 48, which has half the pitch of the other teeth.

The ratchet wheel 45 is operated in the following way: The fabric to be dyed may have for example to pass four times to and fro through the trough; the ratchet wheel 45 and the counting disc 46 are brought in such a position before setting in motion the machine, that the number 4 on the counting disc comes to stand opposite to a pointer 49 fixed to the machine frame. The right pawl 44 lies then with its end on the middle of a ratchet-tooth, whilst the left pawl 44' with its end lies on the bottom of a ratchet-tooth.

By starting the machine, the axes of rotation I and I' of the rocking pawls are brought into the positions II and II' whereby the end of the right pawl 44 is brought forward to the bottom of the ratchet tooth, on the middle

of which it was previously resting, without moving the ratchet wheel. At the same time the left pawl 44' is brought back on the middle of the tooth, on the bottom of which it was resting before. At the next throwing over the axes of rotation, the pawls are brought from the positions II and II' into the positions III and III', whereby the left pawl 44' pushes down the ratchet tooth on its bottom and turns then the ratchet wheel 45 half a pitch round, so that the index number $3\frac{1}{2}$ of the counting disc comes to stand opposite the pointer 49; at the same time, the right pawl 44 comes and rests with its end on the middle of a ratchet tooth.

This performance is repeated, whereby each time the working pawl begins its motion with its end from the middle of a ratchet tooth and turns the ratchet wheel 45 half a pitch around its axis. As the fabric travels back for the fourth time the right pawl rests with its end behind the small ratchet tooth 48 and turns at the next throwing over the ratchet wheel 45 so that the number 0 of the counting disc 46 comes to stand opposite to the pointer 49. It is advisable to provide also a device which gives a signal with a bell or otherwise at this last throwing over; in this way, the operator is warned and knows that he must stop the machine; similarly the said device may be designed to stop the machine automatically.

The gauge rollers 33 and 33', which operate at one end the speed regulating mechanism as described above, act with their other ends on the angle levers 56 and 56' (Fig. 4) suspended on the journals 57 and 57' and transmitting their motion by means of the rods 60 and 60' suspended on the journals 59 and 59' on the spiral springs 62 and 62', which by this motion are compressed or released.

52 and 52' (Fig. 4) are tensioning brake-wheels, over which are laid the brake bands 53 and 53', whose ends are connected with the ends of the brake levers 55 and 55', suspended on the journals 54 and 54'.

The operation of this portion of the machine is the following: The feed cylinder on the shaft 2 is the one, which is shown driven in Fig. 4. The control bar 17' having been moved to the right, the rod 64, connected to it by the journal 63, has, by means of the adjustable nut and washer 65, brought the angle lever 55 in such a position that the left side band brake is released. At the same time on the right side the angle lever 55' has been released from the rod 64 and the pressure of the spring 62' is put upon the brake of the unrolling feed cylinder running on the shaft 2'. Whilst the fabric is wound off from this feed cylinder, the gauge roller 33' approaches the shaft 2' and releases the spring 62' by means of the levers 56', 58', 60'. A contrary motion takes place on the other side of the machine where the fabric is wound up, on the

feed cylinder 1; the gauge roller 33 by moving away from the shaft 2 increases gradually the pressure of the spring 62, whereby the latter cannot act but with a gradually decreasing pressure upon the tensioning brake 52, 53. Moreover the pressure of the spring accumulated in this way facilitates the displacement of the control bar 17 to the left side during the next reversing of the motion of the machine.

Obviously, the present invention is not limited to the features specifically disclosed above and it must be understood that various constructional modifications may be adopted within the scope of the said invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a dyeing machine and other machine for the treatment of fabric, the combination of a driven winding roller and an unwinding roller, two radially movable contact members bearing upon the fabric, one on said winding roller and the other on said unwinding roller, means controlled by the contact member bearing on said winding roller for gradually modifying the speed of rotation of said winding roller according to the number of layers wound thereon, a brake for said unwinding roller and means for operatively connecting said brake with the contact member bearing on said unwinding roller, whereby the braking effect decreases with the number of layers yet to be wound off on said unwinding roller.

2. In a dyeing machine and other machine for the treatment of fabric, the combination of a driven winding roller and an unwinding roller, two radially movable contact members bearing upon the fabric, one on said winding roller and the other on said unwinding roller, means controlled by the contact member bearing on said winding roller for gradually modifying the speed of rotation of said winding roller according to the number of layers wound thereon, a brake for said unwinding roller and means for yieldingly connecting said brake with the contact member bearing on said unwinding roller, whereby the braking effect decreases with the number of layers yet to be wound off on said unwinding roller.

3. In a dyeing machine and other machine for the treatment of fabric, the combination of two rollers adapted to work alternately as winding and unwinding rollers, two disc and wheel change speed gears for each of said rollers adapted to gradually modify the speed of rotation of said rollers, two brakes for the rollers, two radially movable contact members bearing upon the fabric on each roller and adapted each to control its corresponding change speed gear and its corresponding brake, and means for making

inoperative the change speed gear of one roller and the brake of the other roller.

4. In a dyeing machine and other machine for the treatment of fabric, the combination of two rollers adapted to work alternately as winding and unwinding rollers, a main driving shaft, two disc and wheel clutching and speed changing gears adapted to connect and disconnect said rollers and said main shaft and to gradually modify the speed of rotation of said rollers when in the connecting position, connecting means between the two clutching and speed changing gears whereby at least one gear is in the disconnecting position, a swinging member for each roller pivotally mounted thereon and adapted to engage inside the innermost fabric layer, a main control member adapted to be engaged at either end by the corresponding swinging member when the latter is free to swing and also adapted to control the clutching and speed changing gears for alternately connecting either of said rollers with said main driving shaft for reversing the direction of travel of the fabric and two radially movable contact members bearing upon the fabric on each roller and adapted each to control its corresponding clutching and speed changing gear, whereby the travelling speed of the fabric through the machine is kept constant.

5. In a dyeing machine and other machine for the treatment of fabric, the combination of two rollers adapted to work alternately as winding and unwinding rollers, a main driving shaft, two disc and wheel clutching and changing gears adapted to connect and disconnect said rollers and said main shaft and to gradually modify the speed of rotation of said rollers when in the connecting position, connecting means between the two clutching and speed changing gears whereby at least one gear is in the disconnecting position, two brakes for the rollers, connecting means between the two brakes whereby at least one brake is in the inoperative position, a swinging member for each roller pivotally mounted thereon and adapted to engage inside the innermost fabric layer, a main control member adapted to be engaged at either end by the corresponding swinging member when the latter is free to swing and also adapted to bring into the operative position the clutching and speed changing gear of one roller and the brake of the other roller and two radially movable contact members bearing upon the fabric on each roller and adapted each to control its corresponding clutching and speed changing gear and its corresponding brake.

6. In a dyeing machine and other machine for the treatment of fabric, the combination of two rollers adapted to work alternately as winding and unwinding rollers, a main driving shaft, two disc and wheel clutching

and speed changing gears adapted to connect and disconnect said rollers and said main shaft and to gradually modify the speed of rotation of said rollers when in the connecting position, connecting means between the two clutching and speed changing gears whereby at least one gear is in the disconnecting position, a swinging member for each roller pivotally mounted thereon and adapted to engage inside the innermost fabric layer, a main control member adapted to be engaged at either end by the corresponding swinging member when the latter is free to swing and also adapted to control the clutching and speed changing gears for alternately connecting either of said rollers with said main driving shaft for reversing the direction of travel of the fabric, means controlled by said main control member and adapted to indicate the number of back and forth motions of said fabric which are still to be completed and two radially movable contact members bearing upon the fabric on each roller and adapted each to control its corresponding clutching and speed changing gear, whereby the travelling speed of the fabric through the machine is kept constant.

7. In a dyeing machine and other machine for the treatment of fabric, the combination of two rollers adapted to work alternately as winding and unwinding rollers, a main driving shaft, two disc and wheel clutching and speed changing gears adapted to connect and disconnect said rollers and said main shaft and to gradually modify the speed of rotation of said rollers when in the connecting position, connecting means between the two clutching and speed changing gears whereby at least one gear is in the disconnecting position, a swinging member for each roller pivotally mounted thereon and adapted to engage inside the innermost fabric layer, a main control member adapted to be engaged at either end by the corresponding swinging member when the latter is free to swing and also adapted to control the clutching and speed changing gears for alternately connecting either of said rollers with said main driving shaft for reversing the direction of travel of the fabric, a pawl and ratchet attachment, rocking levers operatively connecting said main control member to said attachment, an indicating device adapted to cooperate with said attachment and to indicate when the desired number of back and forth motions of said fabric is completed, and two radially movable contact members bearing upon the fabric on each roller and adapted each to control its corresponding clutching and speed changing gear, whereby the travelling speed of the fabric through the machine is kept constant.

In testimony whereof I have signed my name to this specification.

HANS NABHOLZ. 130