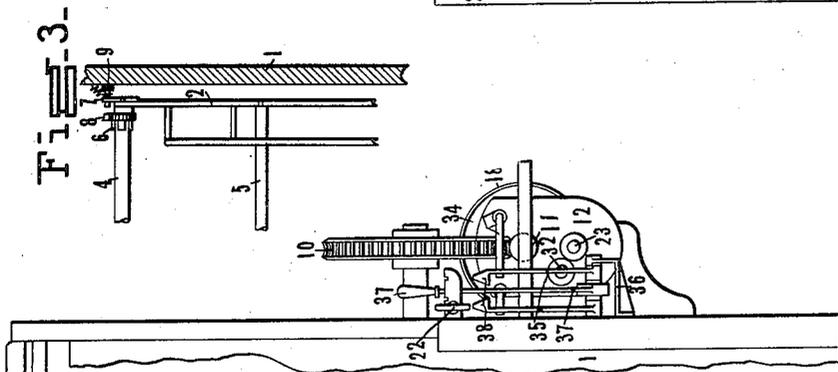
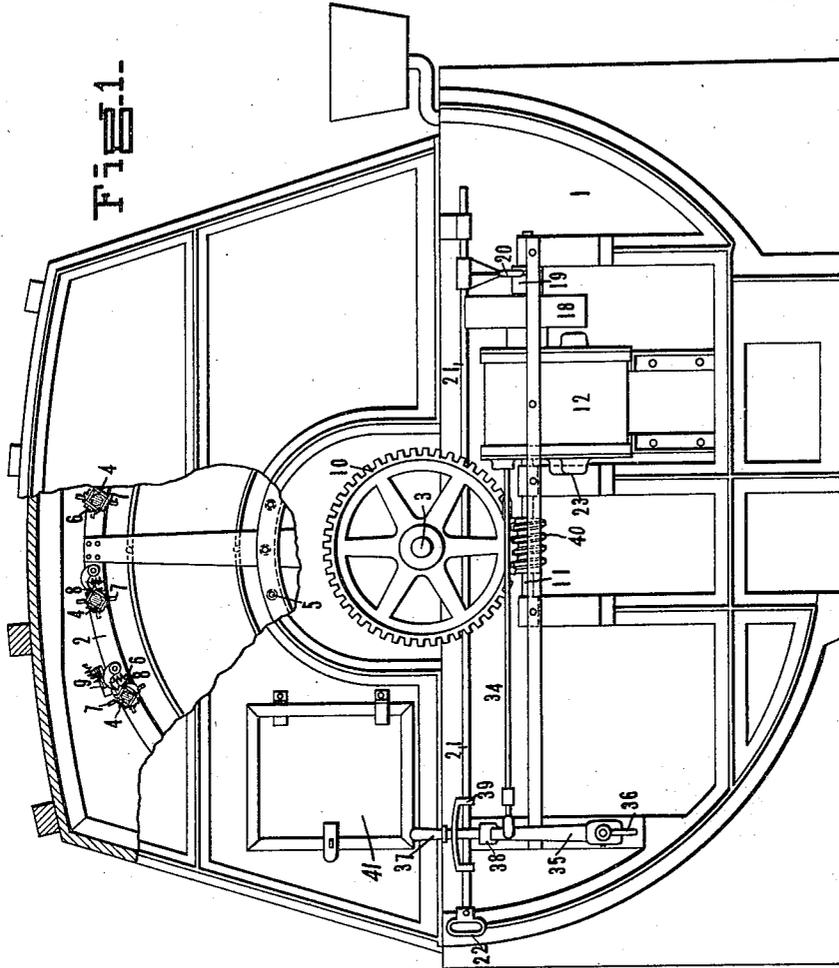


C. FROHLICH.
 DYEING MACHINE.
 APPLICATION FILED JULY 16, 1910.

999,304.

Patented Aug. 1, 1911.

2 SHEETS—SHEET 1.



WITNESSES:
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FIG-2-

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2 SHEETS-SHEET 2.

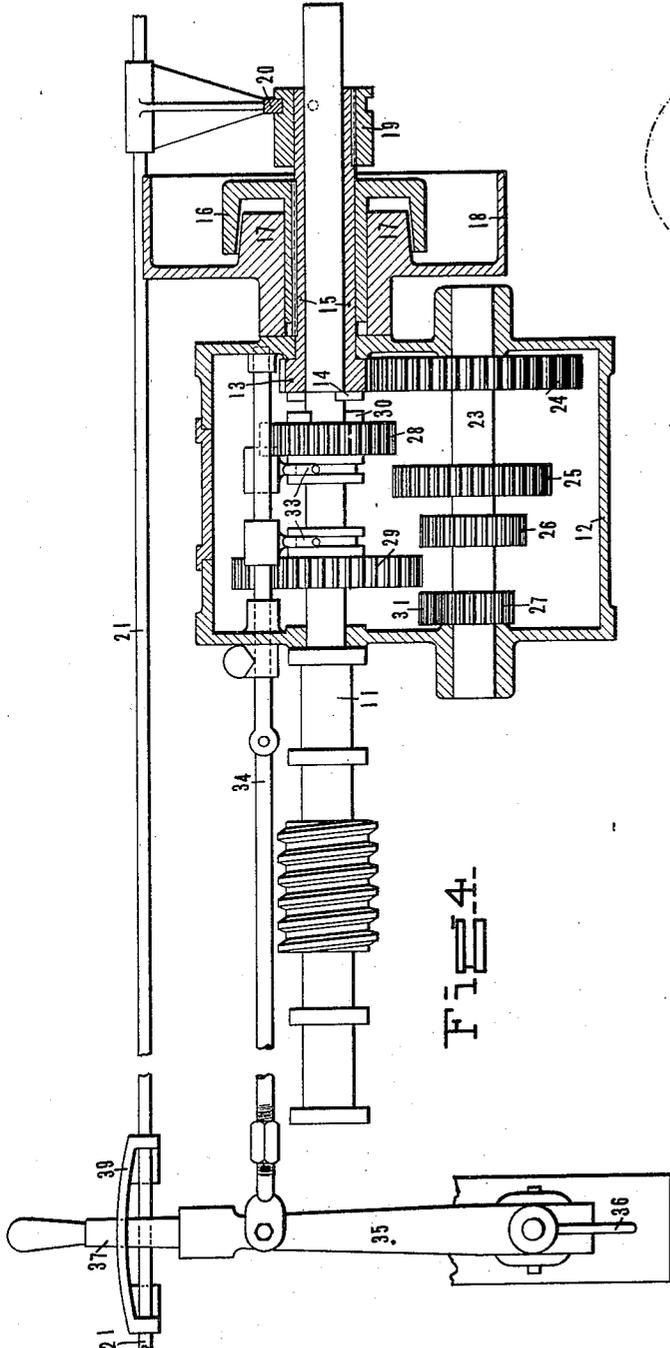


FIG-4-

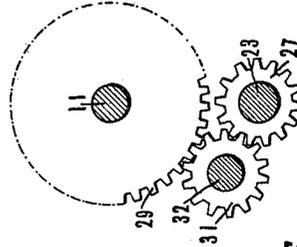


FIG-5-

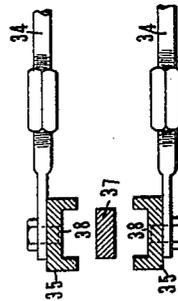


FIG-6-

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UNITED STATES PATENT OFFICE.

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DYEING-MACHINE.

999,304.

Specification of Letters Patent.

Patented Aug. 1, 1911.

Application filed July 16, 1910. Serial No. 572,244.

To all whom it may concern:

Be it known that I, CHARLES FROHLICH, a citizen of the United States, residing at Amsterdam, in the county of Montgomery and State of New York, have invented certain new and useful Improvements in Dyeing-Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to dyeing or scouring machines, and with regard to the more specific features thereof to skein machines.

One of the objects of the invention is to provide such machines with driving mechanism of simple and efficient construction.

Another object of the invention is the production of a skein machine wherein the skeins are passed through the dye-liquor or other fluid in a highly efficient and practical manner to the end that the skeins may be uniformly dyed or thoroughly washed.

Another object sought is more efficient movement of the dye-sticks whereby skeins of fine yarn or slubbing may move slowly through the dye-liquor and have no more motion than is required to change their position on the sticks.

Another object is the provision of a machine wherein the dye-sticks may have effective movements of rotation and translation at different speeds.

Other objects will be in part obvious and in part hereinafter pointed out.

In the following description the invention is embodied in a skein machine for dyeing yarns and the like, for which it is peculiarly adapted, but it will be understood that the machine may also be employed as a scouring or washing machine, the proper liquor being used to accomplish either result. Also it will be observed that certain practical advantages follow from the use of the invention, in dyeing and in scouring, and that results are obtained which have not heretofore been so efficiently accomplished.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

Referring now to the drawings, wherein is shown one of the possible embodiments of

my invention, Figure 1 is an end elevation of a skein machine, partly broken away to disclose the interior. Fig. 2 is a side view of an end portion of the skein machine. Fig. 3 is a side view of a portion of one of the spiders, showing the dye-stick connection. Fig. 4 is a view of the driving mechanism on an enlarged scale. Fig. 5 is a detail sectional view showing the reversing pinion. Fig. 6 is a sectional plan through the shifting lever and the arms with which it coöperates.

Similar reference characters refer to similar parts throughout the several views.

Referring to these drawings in detail, there is shown at 1 a dye-vat or casing in which is carried a skein-support, which, by its movement, carries the skeins into and out of the dye-liquor in the bottom portion of the vat. Preferably, the skein-support consists of a reel comprising spaced spiders 2, but one of which is shown, secured on a shaft 3 adapted to rotate in the casing, and two series of longitudinal dye-sticks 4 and 5, carried by the spiders and around which the skeins are placed and held taut. The dye-sticks of the outer series are movably, preferably rotatably, mounted on the spiders, one end of each stick being secured in a socket 6, rotatably mounted in the spider, and provided with a pin-wheel 7 held from rotation in one direction by suitable mechanism such as a ratchet and pawl 8. When the shaft 3 is rotated the several dye-sticks of the reel move in a circular path in the vat or casing, carrying the skeins which are mounted thereon, into and out of the dye-liquor. At a suitable point within the casing and in the path of the pin-wheel 7 is secured a pin 9 and as the reel rotates the pin 9 causes the dye-sticks of the outer series to rotate intermittently as they pass thereby. Thus, those portions of the skein, which, being in contact with the dyestick, might not be so thoroughly impregnated with the dye as other portions, are removed from contact with the stick, permitting the whole skein to be thereby uniformly dyed. There is no friction on the fibers of the skeins, as the skeins and stick move simultaneously.

In order that the most efficient results may be obtained, and in order to accommodate the dyeing-machine to the various necessities of manipulation, it is preferred to move the dye-sticks at different speeds, depending upon the results desired, the char-

acter of material to be dyed and the kind of dye used, etc. The shaft 3 is accordingly connected to mechanism whereby it may be driven in one direction at several different speeds, in this instance three, and whereby it may be reversed. To this end, said shaft is provided with a worm-wheel 10, located preferably outside the casing. A continuous, preferably horizontal, driving shaft 11 is suitably supported in bearings on the casing, and provided with a worm 40 meshing with wheel 10. The worm-shaft passes through a gear-case 12 and within said casing changeable speed gears are provided, which may be operated to drive the shaft 10 at different speeds and to reverse the movement of said shaft.

A gear or pinion 13 having a clutch-face 14 is rotatably and slidably mounted upon the worm-shaft and has an extended hub 15, to which is keyed one element 16 of a clutch, preferably a friction-clutch, the other element 17 of said clutch being rotatably mounted upon the hub of the clutch element 16 and comprising a belt-pulley 18, to which power may be applied in order to operate the machine. Hub 15 is further provided with a collar 19 fastened thereto and a suitable sliding shifting fork 20 engages said collar to shift the clutch element 16 into and out of engagement with its cooperating element 17 in order to throw the machine into and out of operation. The clutch element 16 is provided with an extended annular hub, which is keyed to the hub of the pinion 13, and said latter hub extends outside the extended hub of the clutch element 17, and forms in effect a continuation of the hub of the element 16, providing a practical means for supporting the pinion 13 at one end and the collar 19 at the other. The fork 20 is shifted by means of a rod 21 provided with a handle 22.

Within the gear-case 12, below the worm-shaft, is a second shaft, or countershaft 23, rotatably supported by the walls of the gear-casing, and having connected thereto to rotate therewith a series of pinions or gear wheels of different sizes. In the present instance, four wheels are provided, a large wheel 24, opposite the gear 13, and constantly in mesh therewith, and three smaller wheels 25, 26 and 27, all of different sizes, and set at different points on the countershaft. On the worm-shaft within the gear-case are splined two gears 28 and 29 spaced apart and of different size, each adapted to slide longitudinally of the shaft, but to rotate therewith. The gears 25 and 26 on the countershaft are so arranged with respect to the slidably mounted gears 28 and 29 that by moving the latter longitudinally of the worm-shaft they may be made to mesh with the former, respectively, depending on which of the gears 28 and 29 is shift-

ed. The gear 28 is further provided on the side facing the gear 13 with clutch teeth 30, adapted to cooperate with clutch-face 14 and be driven directly thereby. It will be understood that the gears 28 and 29 may assume an intermediate position out of engagement with either of the gears 13, 25 and 26 as shown in Fig. 4.

The gear 27 on the countershaft is so placed as not to mesh with the gear 29 when shifted, but an idle gear 31 on a stud shaft 32, secured to the casing, meshing at all times with the gear 27, so placed that the gear 29 may engage therewith when moved laterally a sufficient distance. By reason of the intermediate gear 31, the worm-shaft is caused to rotate in a reverse direction from that caused by the gears 24, 25 and 26.

The changeable speed mechanism is set or adjusted by similar but independent shifting mechanisms by means of which the gears 28 and 29 are moved laterally. Each shifting mechanism comprises a shifter fork 33, engaging an annular slot in the hub of one of the laterally movable gears, said fork being connected to a sliding jointed rod 34 supported in the walls of the casing. The rod extends to a convenient manipulative point where it is pivotally connected to a lever or oscillatory arm 35. A bracket 36 is secured to the casing 1 and supports a shaft on which the arm 35 is pivotally mounted. As before stated, the shifting mechanism for both gears 28 and 29 is similar in construction, and this duplication of the shifting mechanism just described provides two arms 35, pivotally supported by the bracket 36, and capable of oscillation back and forth in a vertical plane. A handle 37 for operating the shifting mechanisms is also mounted on the shaft of the bracket, and as it is intended to move laterally, as well as back and forth, it is connected to the shaft by a suitable form of universal joint, the lower end of the lever being pivoted on an axis extending at right angles to a sleeve loose on the supporting shaft. The upper portions of each of the levers 35 are forked or slotted, as at 38, facing the operating lever to receive the width of said lever when it is moved laterally. There is thus provided a single operating means for the shifting mechanisms. A guide 39 is secured to the frame 1, to limit the extent of movement of the operating lever, and the shifting rod for the friction-clutch passes through and is supported in this guide.

By the described construction of changeable speed gearing and manipulative mechanism therefor, simple and efficient means are provided for governing the operation of the machine, and for giving the dye-sticks motions of translation and rotation, the latter in this instance being intermittent.

The several speed gears may be coupled quickly and without danger of entanglement, and the operation of the machine by one person is conspicuously facilitated.

5 The dimensions of the guide 39 limit the throw of the gears 28 and 29 so that they shall not interfere with each other.

It will be noted that the controlling lever 37 is adjacent the door 41 in the end of the casing whereby one person may control the speed and direction of rotation of the reel and also attend to the positioning of the skeins thereon.

15 In operation, the casing or vat is supplied with dye-liquor, the skeins are placed upon the dye-sticks on the reel, and the casing closed. The lever 37 may then be shifted laterally to engage either of the arms 35, depending upon which of the gears 28 or 29 it is desired to move into engagement with the driving mechanism, and this, of course, will depend upon the object sought in the dyeing operation and whether a slow or a fast speed is desired. Having engaged the lever 37 with one of the arms 35, a forward or backward movement thereof will shift the gears 28 or 29 into engagement with the gears 13, 25, 26, or 31, depending upon the direction of movement.

30 By the construction described, the reel may be run at three different speeds in a forward direction, and at still another speed in a reverse direction, and the yarns passed through the liquor in the manner most efficient for the particular material employed or the result sought. When dyeing fine yarns or slubbing, the slowest speed is made use of, as it is desirable that the skeins should have no more motion than necessary to change their position on the dye-sticks. Also by means of the slow speed the machine may be loaded and unloaded while running, thus avoiding the trouble and wear occasioned by constantly stopping and starting.

45 The fast speed is especially desirable when washing the yarns of the superfluous dye-liquor, and the intermediate speed is useful to modify the effect of the fast speed, in cases where the stock would be agitated too much by the faster speed. It also enables the machine to be loaded more rapidly in those cases where it is desirable to place the load in the liquor at one time.

55 Where the machine is of such a character as to be loaded and unloaded from one side only, it is desirable to reverse the motion of the reel in order that the wheel may have a half revolution from the time that the yarn leaves the hot liquor till it comes to the hand of the operator removing it from the machine. The pin which operates the pin-wheel may be thrown aside, or may be mounted to yield in one direction and permit the pin-wheels to pass during the reverse rotation.

As many changes could be made in the above construction and many apparently different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter 70 contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. It is also to be understood that the language used in the following claims 75 is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween. 80

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

1. In an apparatus of the character described, in combination, a casing, a skein 85 reel mounted to rotate therein, and changeable speed mechanism comprising a reversing slow speed gear adapted to operate the reel.

2. In an apparatus of the character described, in combination, a casing, a reel rotatably mounted therein and provided with dye-sticks, changeable speed mechanism to rotate the reel at different speeds in one direction, and mechanism to rotate the reel 95 in the opposite direction at a different speed.

3. In an apparatus of the character described, in combination, a casing, a shaft in the casing extending outside thereof, a skein reel in the casing driven by said shaft, a changeable speed and reverse gear located outside the casing and adapted to drive the shaft, and a manually operated shifting mechanism adapted to set the changeable speed gear or reverse the rotation of the skein reel. 105

4. In an apparatus of the character described, in combination, a casing adapted to contain a dye liquor, a rotary shaft operatively positioned with relation to said casing, skein carrying means mounted on said shaft adapted to pass the material to be dyed through said dye liquor, change speed and reverse mechanism operatively connected with said shaft for determining its direction of rotation and rate of speed, and manually operated means for setting said change speed and reverse mechanism. 115

5. In an apparatus of the character described, in combination, a casing adapted to contain a dye liquor, a rotary reel positioned within said casing, skein supporting means on said reel adapted to be intermittently rotated as the reel revolves in one direction, means without said casing for controlling 125 the rate of rotation of said reel, and manually operated means whereby said reel may be caused to rotate in a reverse direction.

6. In an apparatus of the character described, in combination, a casing adapted to 130

contain a dye liquor, a reel operatively positioned within said casing, means for rotating said reel, skein supporting means on said reel, means for rotating said skein supporting means as the reel revolves, means without said casing adapted to reverse the direction of movement of said reel, and means to prevent injury to the means for rotating the skein supports as the reel revolves in the opposite direction.

7. In an apparatus of the character described, in combination, a casing adapted to contain a dye liquor, a reel operatively positioned within said casing, means for rotating said reel, skein supporting means on said reel, means for rotating said skein supporting means as the reel revolves, means to prevent reverse rotation of said skein supporting means, means without said casing adapted to control simultaneously the rotation of said reel and skein supporting means and also the direction of rotation of said reel, and means whereby the rotation of the reel may be reversed without injury to the rotating means of the individual skein supporting means.

8. In an apparatus of the character described, in combination, a casing adapted to contain a dye liquor, a rotary reel operatively positioned within said casing, skein supporting means on said reel, means for

rotating said skein supporting means as the reel revolves, and a change speed and reverse mechanism without said casing adapted to control the rate of speed of said reel and skein supporting means and also the direction of rotation of said reel.

9. In an apparatus of the character described, in combination, a casing adapted to contain a dye liquor, a reel within said casing adapted to pass the material to be dyed through said dye liquor, means for rotating said reel, rotary skein supporting means on said reel, means for rotating said means, a door in the casing whereby the material to be dyed may be positioned upon said skein supporting means, a change speed and reverse mechanism without said casing, controlling means therefor adjacent the door in the casing whereby the speed and direction of rotation of said reel and the positioning of the material to be dyed thereupon may be controlled by a single operator, and means whereby said reel may be reversed without injury to means for rotating the skein supporting means.

In testimony whereof I affix my signature, in the presence of two witnesses.

CHARLES FROHLICH.

Witnesses:

L. A. SERVISS,
CHARLES S. NISBET.