

No. 721,630.

PATENTED FEB. 24, 1903.

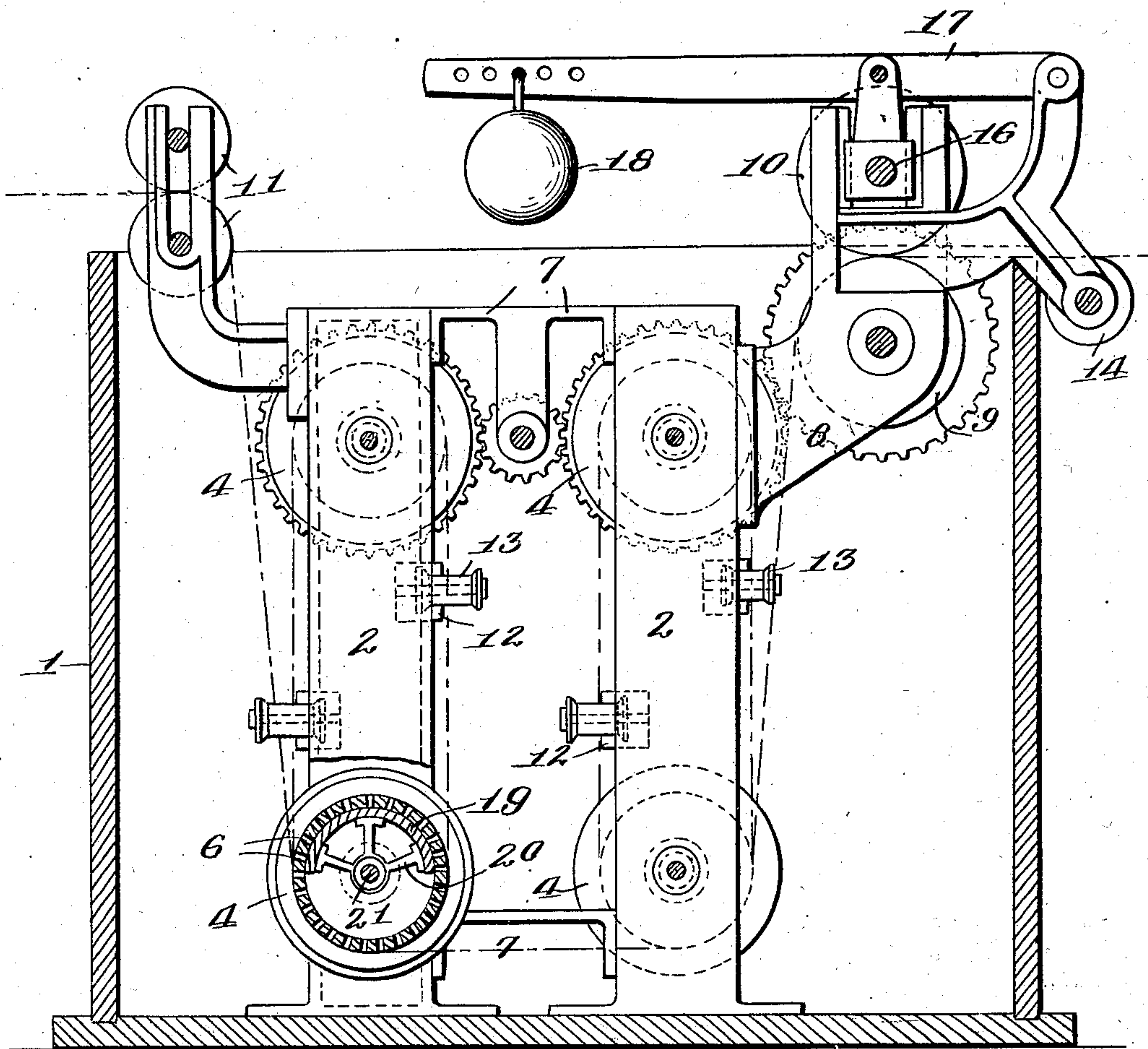
J. A. WILLARD.
DYEING MACHINE.

APPLICATION FILED JUNE 24, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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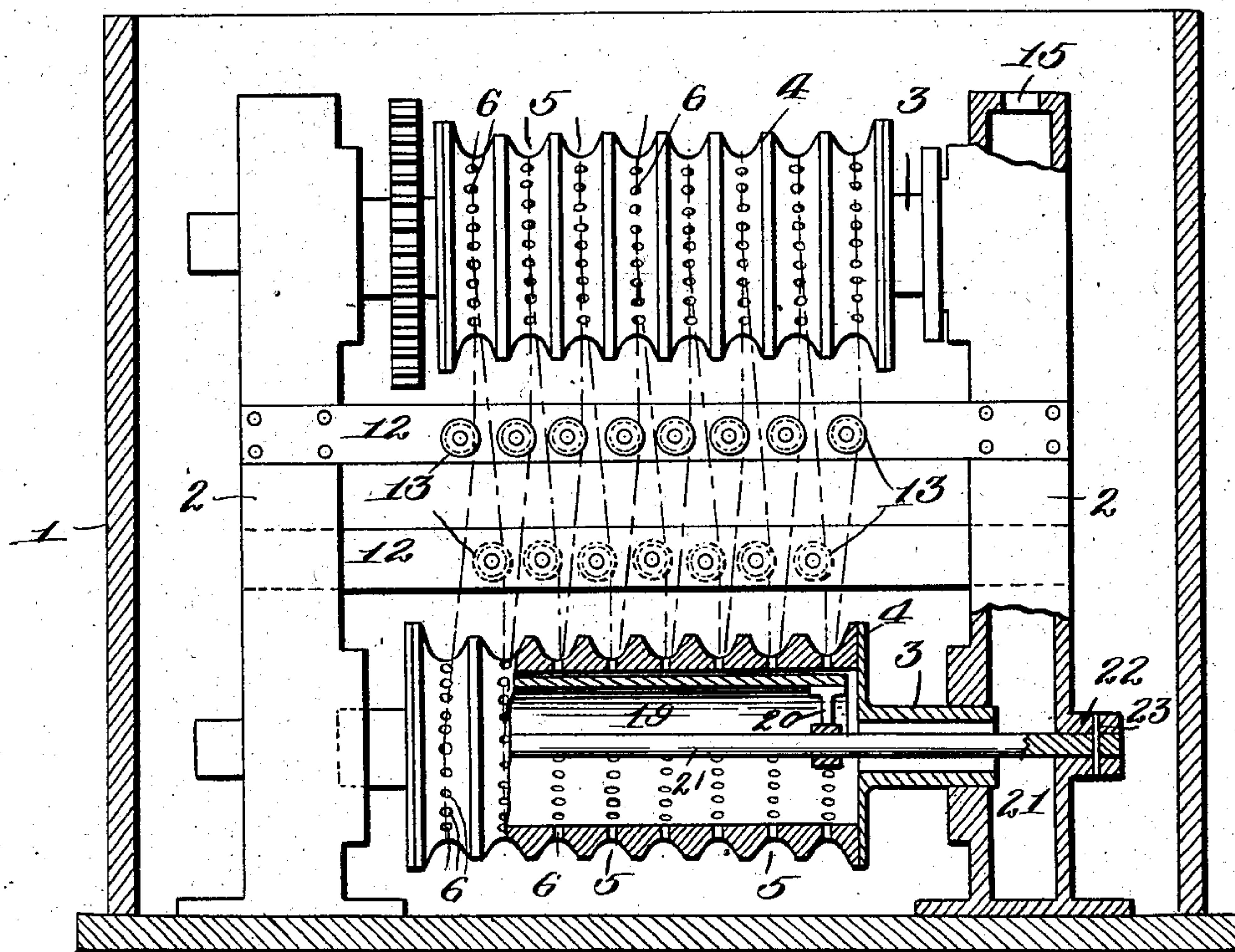
J. A. WILLARD.
DYEING MACHINE.

APPLICATION FILED JUNE 24, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

JAMES A. WILLARD, OF CHATTANOOGA, TENNESSEE, ASSIGNOR TO VACUUM DYEING MACHINE COMPANY, OF CHATTANOOGA, TENNESSEE, A CORPORATION OF TENNESSEE.

DYEING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 721,630, dated February 24, 1903.

Application filed June 24, 1902. Serial No. 113,018. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. WILLARD, a citizen of the United States, residing at Chattanooga, in the county of Hamilton and State of Tennessee, have invented new and useful Improvements in Dyeing-Machines, of which the following is a specification.

This invention relates to a dyeing-machine; and the objects and advantages thereof will be set forth in the following description, while the novelty of the same will constitute the subject-matter of the claims succeeding such description; and said invention is clearly illustrated in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a sectional side elevation of a dyeing-machine including my improvements. Fig. 2 is a cross-sectional front elevation of the machine.

Like characters refer to like parts in both figures of the drawings.

My improved machine is especially adapted for dyeing warps or yarns in one continuous length at one operation.

A method now in vogue for dyeing warps is to run the same over rollers mounted in a vat or tank, the rollers being submerged in the dye liquor, if the goods so require. This process is objectionable inasmuch in order to secure the desired shade it is necessary to run the warp-threads through the tank or vat from five to eight times. This not only requires time, but is frequently injurious to the warps, as by such constant handling the threads thereof are liable to be broken and thereby tangled or the same may be otherwise affected.

In a dye of what are termed "basic colors" it is necessary by the customary method to perform as many as five operations, to wit: running it through the sumac, then rinsing, then into the antimony salt, then rinsing again, and then into the color, which makes five steps besides those hereinbefore stated, and therefore it will be obvious that eight distinct operations are necessary before the warp is properly dyed. In warps which require a bottom and top color it is necessary to first run it through the bottom color and

then through the top color, as in the case with basic colors. By my improved machine, however, it is necessary, in order to secure proper work, that the warp should be passed through the machine simply once, and I will now proceed to describe such machine in one convenient embodiment thereof, which is simple in construction and highly efficient in action.

The numeral 1 indicates a tank or vat of suitable material—such, for example, as wood—and which is adapted to receive a solution of dye liquor and several of the rollers, and in some cases there may be several of these tanks arranged in series, the warps after they leave one machine being adapted to be brought under the action of the succeeding machine, and so on.

Located within the tank 1 and at opposite sides thereof are the standards or columns 2, it being seen that there are two pairs of these standards and that they are hollow. The hollow columns or standards have widened bases or feet resting on and suitably secured to the bottom of the tank or vat 1, and they are adapted to rotatively support the hollow journals 3 of the hollow rolls 4, it being obvious that the interiors of the cooperating columns and rolls are in communication, so that dye liquor can be forced from the columns into the rolls through the hollow journals of the latter. It will be seen on reference to Fig. 1 that there are two pairs of superposed rolls. The several rolls are transversely grooved upon their peripheries, as at 5, and in the bottoms of the grooves are formed a multiplicity of perforations 6, through which the dye liquor can be forced.

The standards or columns 2 are strengthened by the braces 7, connected to the same near their upper and lower ends, and the columns on the right in Fig. 1 have aligned brackets 8 near their upper ends to rotatively support the shaft of the lower drawing or squeezing roll 9, which is adapted to cooperate with the superimposed drawing or squeezing roll 10, yieldingly supported by the brackets and hereinafter more particularly described.

The shaft of the roll 9 is connected by a train of gears with the upper dye-rolls 4, so that the said rolls when one of the shafts

thereof is properly actuated can be operated in unison, so as to impart a traveling movement to the warps which pass in contact therewith.

5 The warp-threads are initially received between the superposed tension-rolls 11, the gudgeons of which are fitted for vertical movement in elongated slots in the vertical portions of the aligned and approximately L-shaped brackets carried at or near the upper ends of the columns 2 at the left of the machine.

15 The columns are connected at suitable points by the cross-pieces 12, four of the same being shown and two of them being located in a common horizontal plane above the other two, which are also in the same horizontal plane. The cross-pieces 12 rotatively receive the spools 13, the spools being substantially
20 aligned vertically with the grooves in the co-acting rolls 4.

The warp-thread after it leaves the tension-rolls 11 extends downward into contact with the first spool 13 on the left of the column 2
25 at the left, then into the first groove of the lower left roll 4, and then upward against the first spool 13 of those on the right of said left column and then into the first groove of the upper left roll 4. The warp is then continued downward into contact with the second spool on the left of the left standard and is then placed in the second groove of the lower roll, and this operation is continued until all of the grooves in the rolls 4 on the left are filled. The thread is then carried to
35 the right and placed in the last groove of the lower right rollers and is then carried up into contact with the final right upper spool, then around the final groove in the upper right roller, and then downward against the final spool of the lower right series and then into the next to the last groove of the lower right roller, this operation being continued until all of the rollers 4 on the right are filled, at
45 which point the thread is carried upward and passed between the drawing and compression rollers 9 and 10 and over the suitably-supported guide-roller 14. It will be understood that when the machine is first started it has
50 to be threaded up; but thereafter when one warp is dyed a new one is fastened to the end of the old one and the operation continued indefinitely. The several spools 13 properly guide the warp.

55 The tank 1 is filled with water to a suitable level, at least to the height of the upper rolls 4, and the dyestuff, having been previously dissolved, is put into the water, and when the several rollers are operated the warp-thread
60 is caused to travel through the tank, so that the body of the dye liquor therein can properly impregnate the same, and in order to facilitate the dyeing operation I provide means for effecting the forcing of the dye liquor
65 through the warp.

The hollow columns, or at least those on the right in Fig. 2, have inlets 15 at their up-

per ends for the dye liquor, and in practice I provide a suction-pump for drawing the fluid from the tank 1 and delivering it into
70 the columns or standards 2 and the inlets 5, the liquid thus drawn up by the pump being forced thereby through the columns and from the latter into the hollow perforated dye-rolls
75 4 by way of the hollow journals 3 of the said rollers, and the liquid under pressure is forced through the perforations 6 and through the warp, which, it will be apparent, crosses such perforations. It will be therefore ob-
80 vious that the yarn is not only submerged in the dye liquor as it passes through the tank, but that such liquor is positively forced through the yarn as it travels in contact with the several rolls, so that the results are se-
85 cured at a single operation in a better and more desirable manner than had been previously accomplished by passing the warp through the dyestuff a large number of times. The pump for securing the circulation of the
90 dye liquor is not shown herein, as it forms no part of the present invention, and any convenient style or kind of such an appliance may in practice be utilized for the purpose indicated.

After the yarn leaves the lower right roller,
95 as previously stated, it extends upward therefrom and passes between the superimposed rollers 9 and 10, which draw the same and also express the superfluous liquid therefrom, such liquid dropping into the tank 1.
100

The shaft of the upper roller 10 is carried by vertically-slidable bearing-blocks 16, movable in slots or notches in the upper side of the brackets 8, and said blocks are provided with perpendicular arms upon their upper
105 sides, to which the levers 17 are pivoted, the levers being shown as fulcrumed at their right ends to the said brackets and carrying adjustable counterweights 18 at their opposite or free ends. The said counterweights
110 are provided with hooks adapted to engage one of a series of holes formed in line near the free ends of the levers, so that the two weights can be adjusted in order to regulate the pressure of the upper roll 10 upon the
115 lower one 9.

For different kinds of dyework the number of rolls may be increased, and the same applies to the tanks, the material after it leaves the guide-roller being adapted to pass under
120 the action of the mechanism precisely like that hereinbefore described.

It will be evident that when the material is forced from the inside of the rolls 4 through the yarn wound upon said rollers it enters
125 the tank, and I provide valves to shut off the upper sides of the lower rolls and the lower sides or halves of the upper rolls, it being understood that the yarn travels in contact simply with the lower halves of the lower rolls
130 and the upper halves of the upper rolls.

Inclosed by the respective rolls 4 are the valves 19, consisting of semicircular plates connected by radial arms 20 with the shafts

21, the said shafts 21 extending entirely through the respective rolls and also through the hollow journals 3 thereof and the hollow standards or columns, the ends of the said shafts 21 being supported in bosses 22 upon the outsides of the several columns. The said shafts are prevented from turning by pins 23, extending through perforations in one end of each shaft, and the coöperating bosses. It will be understood that the lower valves or plates 19 cover the perforations 6 in the upper half of the lower rolls, while the upper valves cover the perforations in the lower halves of the upper rolls. As it is not necessary to use the perforations covered by the valves, the latter prevent the discharge of the liquid dye through such perforations and the peripheries of the valves are contiguous to the inner surface of the rolls at the places indicated.

The invention is in no wise limited to the construction hereinbefore set forth, for many variations may be adopted within the scope of the following claims.

Having described my invention, what I claim is—

1. In a machine of the class specified, a hollow roll adapted to receive a thread and having a perforated periphery and standards for sustaining the rolls, one of the standards being hollow and in communication with the interior of the roll and having an inlet for dye liquor.

2. In a machine of the class specified, a hollow roll having a plurality of transverse grooves, each groove being adapted to receive a thread and perforated, and standards sustaining such rolls, one of the standards being hollow and in communication with the interior of the rolls, and having an inlet for dye liquor.

3. In a machine of the class specified, a plurality of hollow rolls, each adapted to receive a thread and having a perforated periphery, and standards for sustaining said rolls, one of the standards being hollow and in communication with the interiors of the rolls, and having an inlet for dye liquor.

4. In a machine of the class specified, a hollow roll adapted to receive a thread, and having a perforated periphery, standards for sustaining said roll, one of the standards being hollow and in communication with the interior of the roll, and having an inlet for dye liquor, and a plurality of guiding devices for a warp-thread arranged in coöperative relation with said roll.

5. In a machine of the class specified, a hollow roll adapted to receive a thread, having a perforated periphery, standards for sustaining said roll, one of the standards being hollow and in communication with the interior of the roll, and having an inlet for dye

liquor and a valve for closing certain of the perforations in said roll.

6. In a machine of the class specified, a hollow roll adapted to receive a thread, and having a perforated periphery, means connected with the roll for supplying dye liquor thereto, and a valve for covering certain of the perforations in the roll.

7. In a machine of the class specified, a pair of superposed rolls, each adapted to receive a thread, and having perforated peripheries, valves in the rolls, the lower valve being adapted to close the perforations in the upper half of the lower roll, and the upper valve being adapted to close the perforations in the lower half of the upper roll, and means for carrying the dye liquor to the interiors of the rolls.

8. In a machine of the class specified, a plurality of hollow rolls having transverse perforated grooves adapted to receive a thread, means for operating the rolls in unison, and a plurality of spools arranged in sets and each set being coöperative with a roll, and the spools being adapted to guide the thread.

9. In a machine of the class specified, a hollow roll adapted to receive a thread, and having a perforated periphery, standards for sustaining said roll, one of the standards being hollow and in communication with the interior of the roll, and having an inlet for dye liquor and a valve for closing certain of the perforations in said roll and supported by said standards.

10. In a machine of the class specified, a tank adapted to receive dye liquor, a hollow roll adapted to receive a thread, and having a perforated periphery, and standards in said tank for sustaining the roll, one of the standards being hollow and in communication with the interior of the roll, and having an inlet for the dye liquor.

11. In a machine of the class specified, a plurality of hollow rolls adapted to receive a thread, and having a perforated periphery, standards for sustaining said roll, one of the standards being hollow and in communication with the interior of the roll, and having an inlet for the dye liquor, a tank adapted to receive said rolls, guiding means for the thread arranged in coöperative relation with the respective rolls, and a pair of drawing and expressing rolls through which the thread is adapted to pass after it leaves the last hollow roll.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES A. WILLARD.

Witnesses:

CHAS. S. HALL,
J. H. CANTRELL.