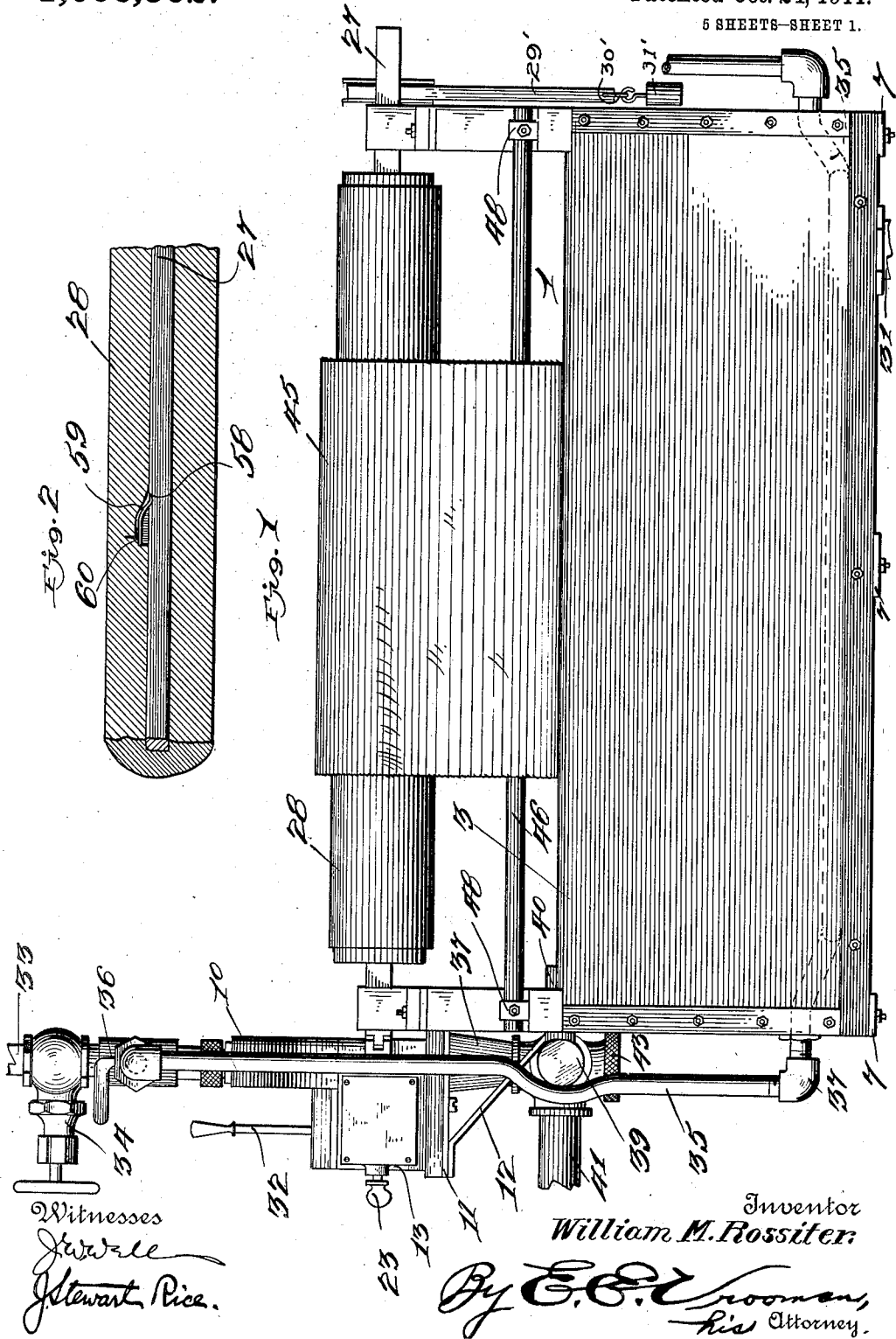


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DYE TUB APPARATUS.
APPLICATION FILED DEC. 24, 1909.

1,006,502.

Patented Oct. 24, 1911.

5 SHEETS-SHEET 1.

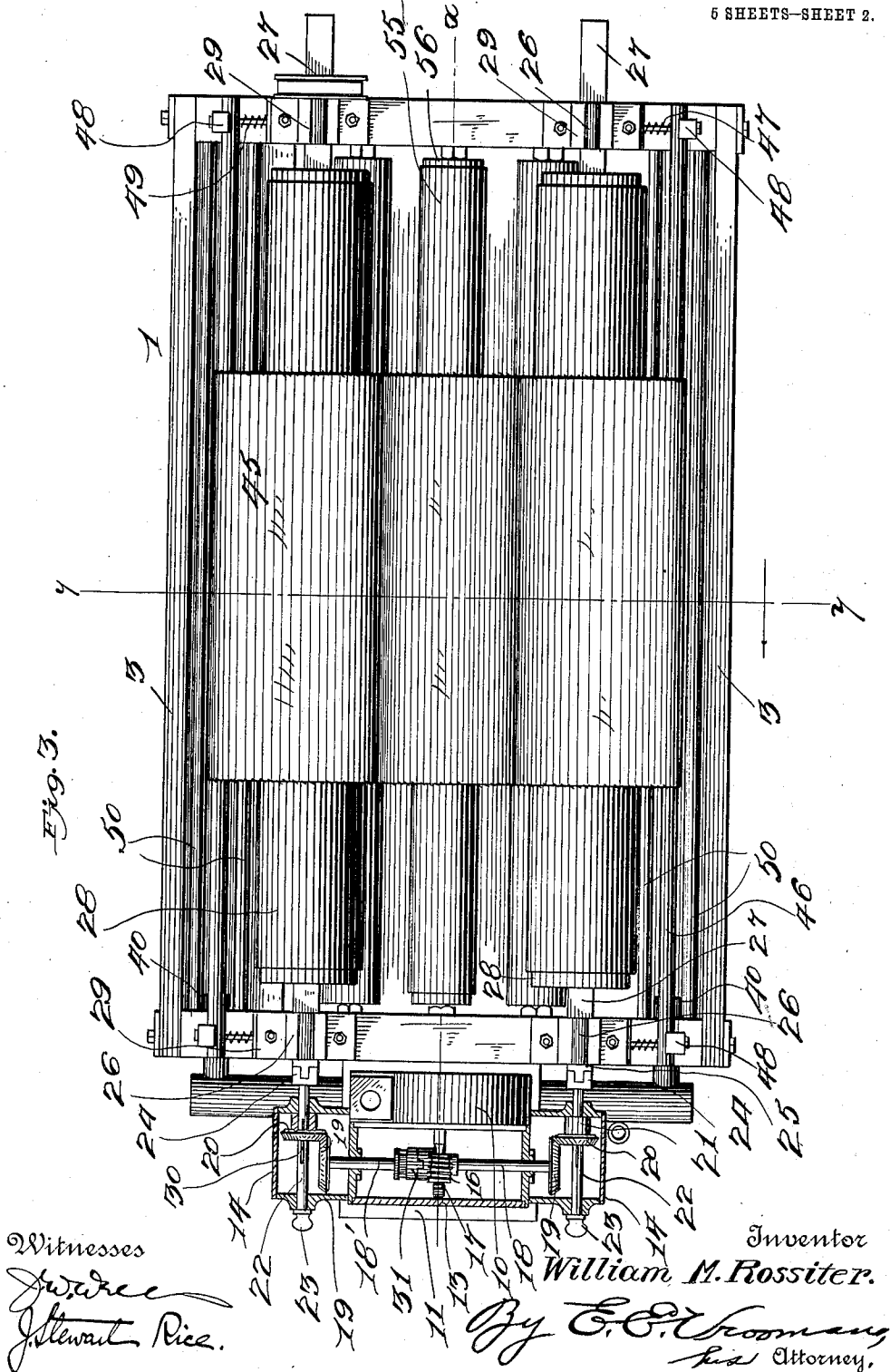


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5 SHEETS—SHEET 2.



Witnesses

W. A. Rice
J. L. Rice

Inventor

William M. Rossiter.

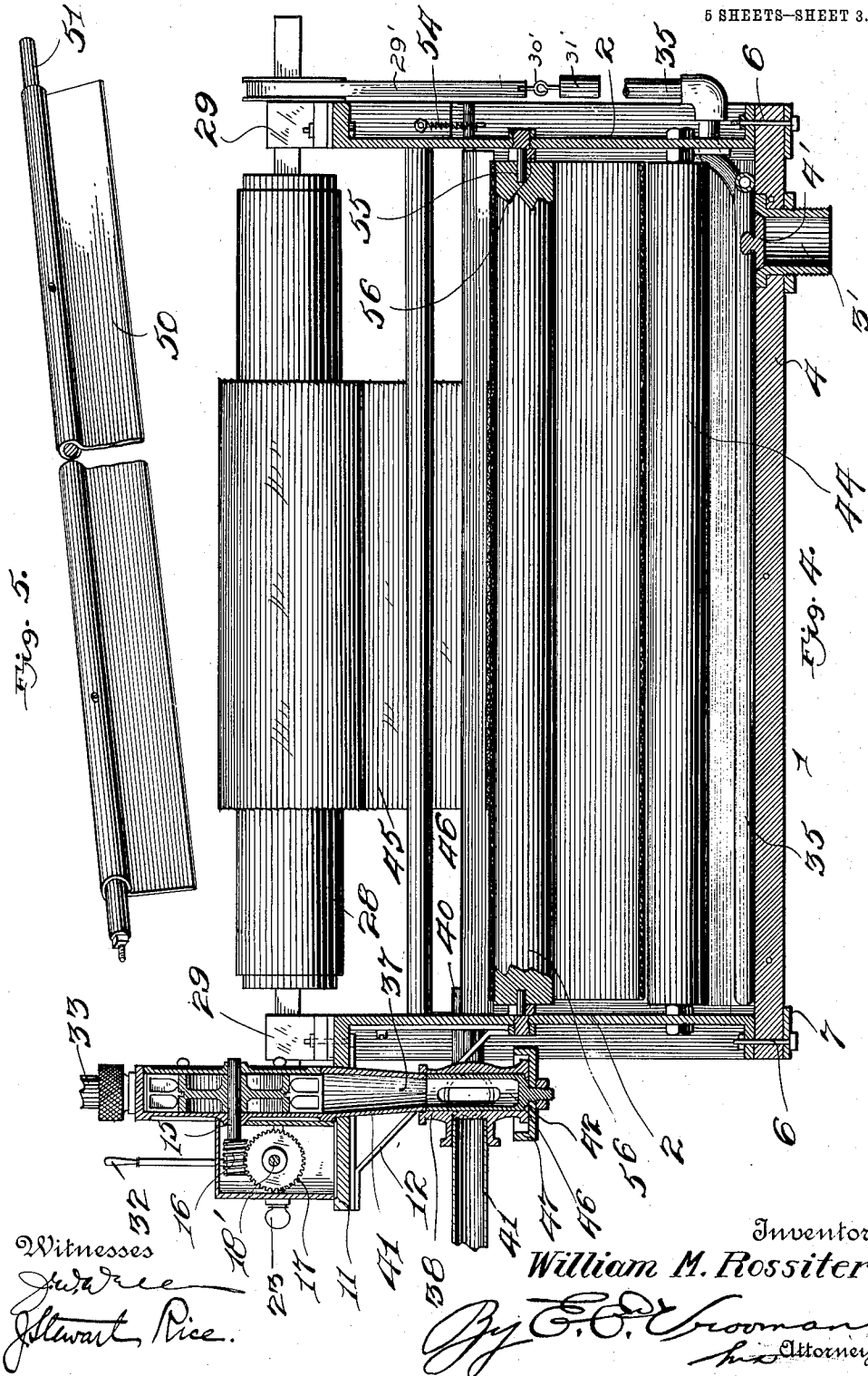
By *E. C. Hoeman*
Attorney.

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5 SHEETS—SHEET 3.



Witnesses

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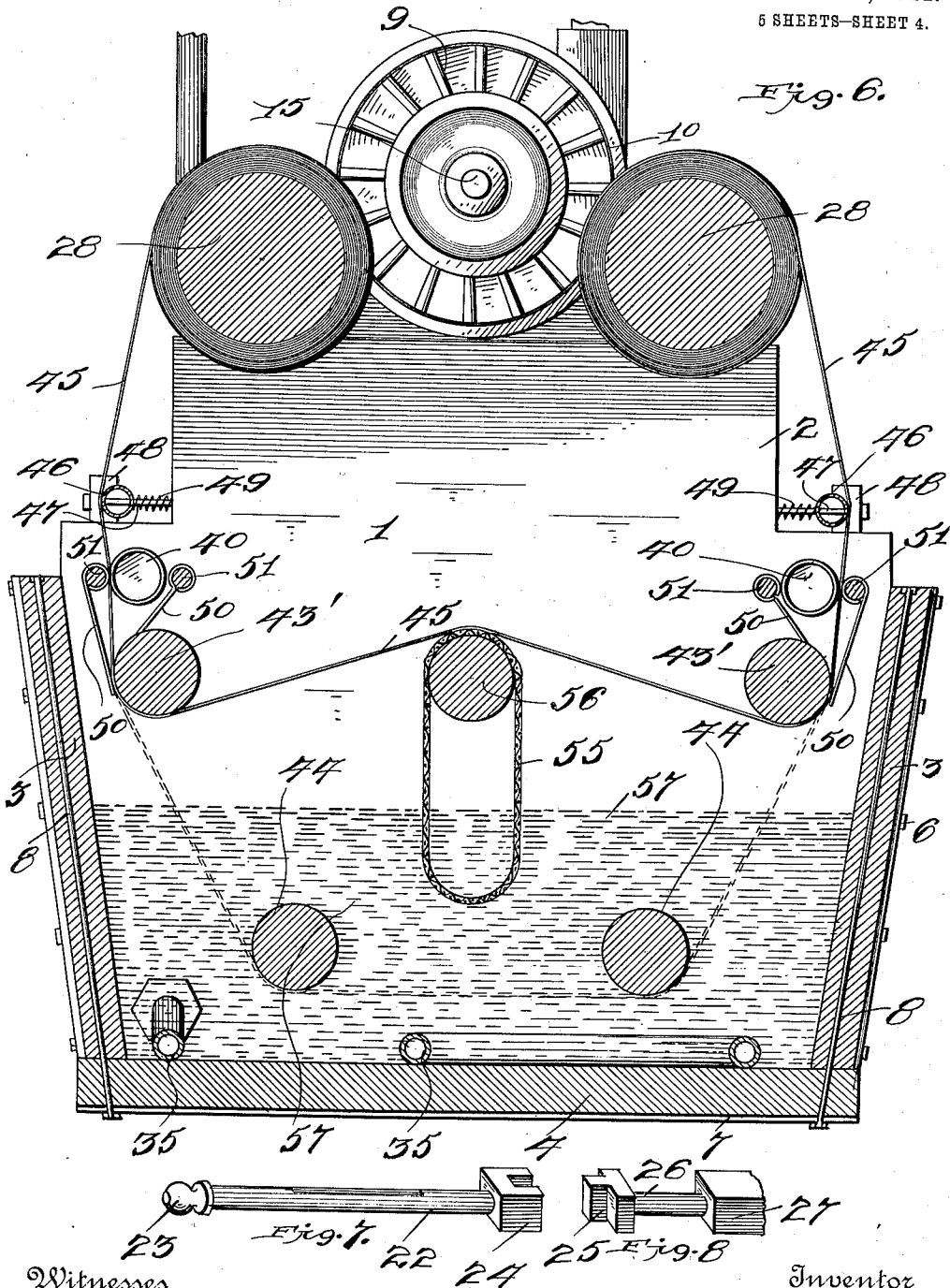
By E. C. Crooman
Attorney

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5 SHEETS—SHEET 4.



Witnesses

James Stewart Rice

Inventor

William M. Rossiter.

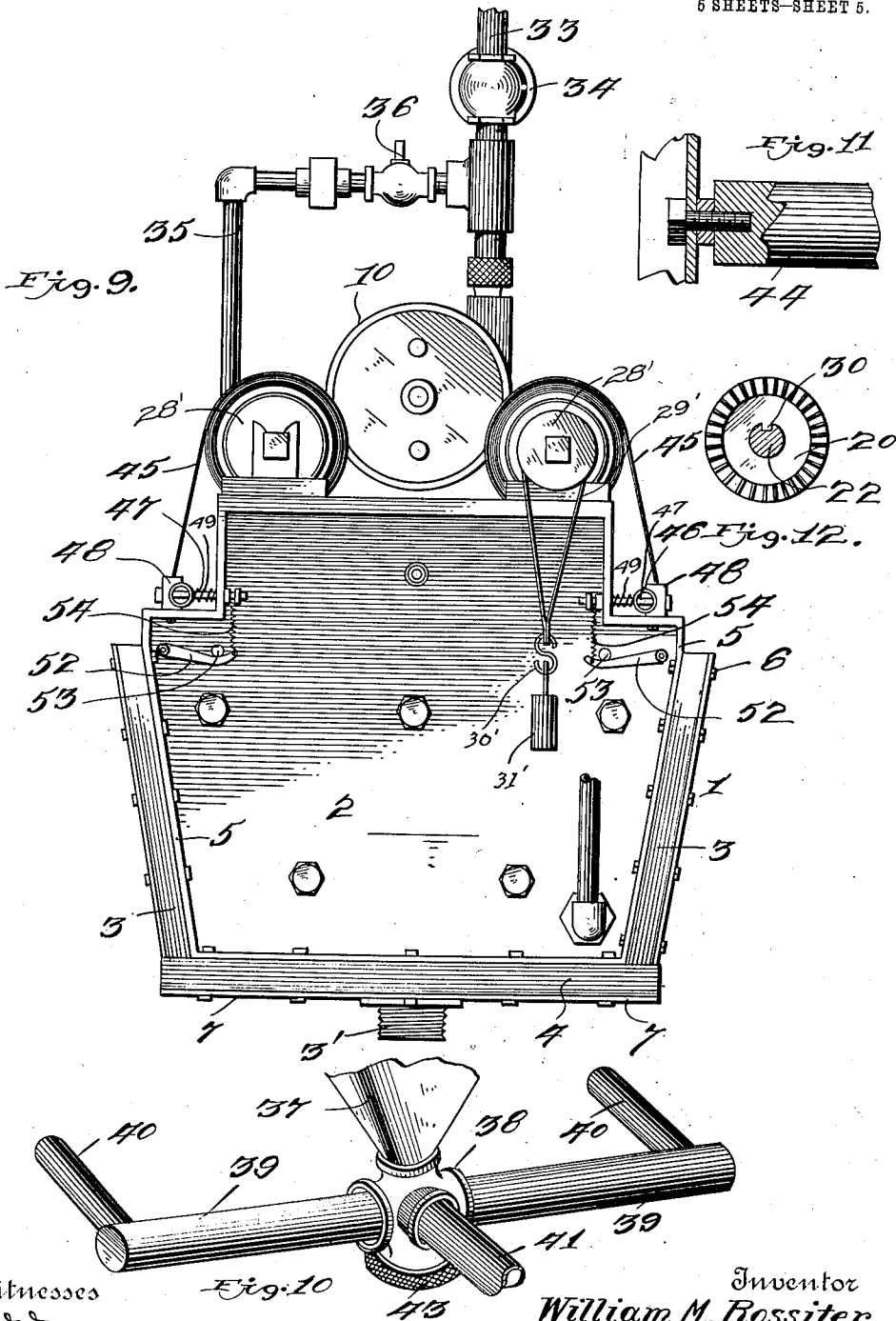
By E. C. Crooman,
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

WILLIAM M. ROSSITER, OF SUNBURY, PENNSYLVANIA.

DYE-TUB APPARATUS.

1,006,502.

Specification of Letters Patent.

Patented Oct. 24, 1911.

Application filed December 24, 1909. Serial No. 534,833.

To all whom it may concern:

Be it known that I, WILLIAM M. ROSSITER, a citizen of the United States of America, residing at Sunbury, in the county of North-

umberland and State of Pennsylvania, have invented certain new and useful Improvements in Dye-Tub Apparatus, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to dyeing apparatus, and has special reference to that class of dyeing apparatus in which a vat is employed in conjunction with driving and conveyer rollers.

The invention has special reference to dyeing apparatus which is employed in the dyeing of textile fabrics and especially in the form of strips, bands or sheets, and has for its object to accomplish a uniform dyeing of the material from end to end and from side to side. Great difficulty has been experienced hitherto in dyeing fabric uniformly on account of the strength of the dye bath varying during the operation of dyeing.

Another object of the invention is to overcome this difficulty by means of which constant strength of the dye bath is practically assured.

Another object of the invention is to apply the dyeing liquid to the fabric in such a manner as to produce a uniform action on every part of the goods.

Another object of the invention is to recover the water used for power for the purpose of washing the goods.

Another object of the invention is to utilize the condensation of the steam used in heating the dye bath for power.

Another object of the invention is to provide an improved dye tub apparatus by means of which goods may be removed from the tub without loss of time.

Referring to the accompanying drawings, Figure 1 is a side view in elevation of a dye tub apparatus, constructed in accordance with this invention. Fig. 2 is a detail view, partly in longitudinal section and broken away, of a portion of a roller showing means for securing its shaft in place. Fig. 3 is a plan view of the invention, partly in horizontal section, disclosing a portion of the driving mechanism. Fig. 4 is a longitudinal section of the apparatus on the line $x-x$, Fig. 3. Fig. 5 is a detail view, in perspective and partly broken away, of one of

the gates. Fig. 6 is an enlarged view, in cross section, on the line $y-y$, Fig. 3, disclosing the water motor. Figs. 7 and 8 are detail views of the means for disconnecting the driving rollers from the operating mechanism. Fig. 9 is an end view of the apparatus. Fig. 10 is a detail view in perspective showing the branch pipe utilized in washing the goods. Fig. 11 is a detail view of a portion of one of the conveyer rollers and its pivotal support at one end of the vat. Fig. 12 is a detail view showing a portion of the operating mechanism.

In carrying out the invention, I provide a vat 1, preferably having metallic ends 2, wooden sides 3, and a wooden bottom 4, with an outlet 3' and stopper 4', said metallic ends being secured to the wooden sides and bottom by means of a flange 5 and bolts 6 extending through said flange 5 and the wooden sides and bottom and through a metallic strip 7, which strengthens and reinforces the vat. The sides 3 are secured to the bottom 4 by bolts 8 extending from top to bottom of the sides.

Any suitable mechanism may be employed for operating the driving rollers of the apparatus, and as here shown in Fig. 6 a water motor 9 is employed mounted in a casing 10 supported on a shelf or extension 11 of one of the metallic ends of the tub, said shelf being braced by brackets 12 secured to the metallic ends of the tub. In conjunction with the water motor an operating mechanism is employed mounted in a casing 13 on the shelf 11 and in end casings 14, the shaft 15 of the water motor having on its end a worm gear 16 meshing with a worm wheel 17 mounted on a shaft 18 which is connected to a shaft 18' by a locking joint hereinafter described.

The shafts 18 and 18' extend through the ends of the casing 13 and each has on its outer end a beveled gear wheel 19 meshing with a beveled gear wheel 20, said beveled gear wheel 20 being mounted on a shaft 22 slidably connected therewith, as hereinafter described, which shaft 22 is provided at its outer end with a knob or handle 23, the inner end of said shaft 22 being detachably connected to the shaft of the driving roller by means of a coupling joint formed of the two interlocking parts 24 and 25, the part 25 being on the outer end of the bearing spindle 26 of the shaft 27 and projecting from the driving roller 28, the spindles 26

of the shafts 27 of the driving rollers detachably resting in vertical U-shaped seats or bearings 29. The beveled gear wheel 20 is held from turning on its shaft 22 by means of a spline 30 which enables the shaft 22 to be moved longitudinally through the casing 19 by means of the knob or handle 23, to engage or disengage the shaft 22 from the shaft of the driving roller 28. It will be seen that by means of this construction the driving rollers may be disconnected from the operating mechanism and lifted out of their bearings when it is necessary to remove them. The shaft 18 and beveled gears 19 and 20 may be disengaged from the worm wheel 17 by means of the coupling joint 31, and a lever handle 32 projecting up through the casing 13.

Water may be supplied to the water motor 13 by means of a pipe 33 connected with the motor and controlled by a valve 34. The motor may be driven by means of the water of condensation of the steam which is passed through a heating coil located in the bottom of the vat, the water of condensation flowing from said coil primarily and secondarily when the water of condensation has been emptied from the coil by the exhaust from said coil.

The pipe for heating the dye liquid consists of a steam pipe 35 which enters the vat at the end opposite to the motor and extends over the bottom of the vat in folds or convolutions, said pipe 35 passing out the other end of the vat and connecting with the motor through the pipe 33, the passage of water to the pipe 33 being controlled by a valve 36. The steam being admitted at one end of the vat through the pipe 35 and passing through the convolutions or coils, which extend through the cold dye over the bottom of the dye vat, is condensed thereby and is then conveyed directly to the motor, the valve 34 being closed and the valve 36 being open. As the motor 13 operates, the water is discharged therefrom through a tapering discharge passageway 37 to which is connected, by means of a coupling 38, branch pipes 39 having end portions 40 which project through the end of the vat into the same, and which are utilized for washing fabric. Said coupling 38 is also provided with a discharge pipe 41 through which the waste water may be carried off to a sewer or other place of discharge.

The flow of liquid through the branch pipes 39 and 41 is controlled by a valve 42 operated by means of a thumb nut or handle 43 so that when it is desired to use branch pipes 39 and 40 to convey water to wash the goods in the vat, the pipe 41 is closed by means of said valve 42, which also serves to close the branch pipes 39 when desired to permit the water discharged from the motor to pass off through the waste pipe 41. By

means of the main supply pipe 33 with its controlling valve 34 and the steam pipe 35 with its controlling valve 36, either the water of condensation from the steam may be utilized to drive the motor 13, the valve 36 being open and the valve 34 closed; or else by closing the valve 36, the motor 13 may be driven by water passing through the main supply pipe 33, the valve 34 being open. The steam is admitted in one end of the coil, and as it passes through the coil, which is in direct contact with the cold dye, condenses and is then conveyed directly to the motor, for the purpose of furnishing power; or may be conveyed to a reservoir or storage tank thereby storing up a supply of water, which may then be conveyed to the motor or various motors which may be employed throughout the dyehouse. By means of this utilization of the water of condensation in the steam pipe or by means of the water from the main supply pipe, a battery of four tubs or vats may be driven with one motor, the power from the motor being transmitted to the driving rollers and the other vats by means of aligned shafts and suitable gears.

In addition to the driving rollers 28 which are mounted on the top of the ends of the vat, conveyer rollers 43' are employed having their bearings in the ends of the vat and located toward the top of the vat and adjacent to its sides, and other conveyer rollers 44 are located adjacent to the bottom of the vat and at a distance from its sides with their bearings mounted in the ends of the vat. The fabric 45 is mounted, as shown, on the driving rollers 28 and extends downward over the tubular rod 46 which, adjacent to its ends, is mounted on transverse rods 47 projecting through a post 48 and extending to the sides of the ends 2, said rod 46 being held in yielding position by means of a spring 49 against the fabric 45. The fabric 45 extends down over the rollers 43' and 44 when it is to be washed, as shown in dotted lines in Fig. 6.

As shown in Fig. 6, the branch pipes 40 project into the vat through one end thereof, each above a conveyer roller 43', and, in conjunction therewith gates 50 are employed, which consist of longitudinal strips of metal extending from end to end of the vat and hinged by means of rods 51 having their ends mounted in the end of the vat at each side of the branch pipe 40. Both of said gates bear against the roller 43', the fabric 45 passing between one of said gates and the roller 43'. It will be seen that by means of this arrangement a discharge of water passing out of the branch pipes 40 is discharged between the gates 50 onto the fabric as it passes over the rollers 43'. One of said gates 50 is held against the fabric by any suitable spring-actuated means and, as

shown in Fig. 9 by means of an arm 52 on one end of the vat and held up against a stop pin 53 by means of a spring 54 connected to the arm 52 at one end and at its other
5 end to the rod 47.

In order to retain the driving rollers 28 in position, their shafts are each provided at one end with a grooved pulley 28', over which extends a looped cord 29', the loop 29' depending from the roller 28' and having
10 suspended therefrom by means of a hook 30' or other suitable device, a weight 31', as shown in Fig. 9. By this means the shaft of the roller 28 will be prevented from jumping
15 out of its bearings.

In order to overcome the difficulty of uneven dyeing, I employ an endless belt 55 of material that has great absorbing power, said belt extending over and depending
20 from a roller 56 centrally located in the vat at a little distance from the surface of the liquid dye 57 with its bearings in the metallic ends of the vat, said belt being of suitable width and of a length adapting it to
25 depend in and be partly immersed in the liquid dye 57, as shown in Fig. 6.

As shown in Fig. 6, the fabric 45 passes down over one of the conveyer rollers 43' and then over the conveyer roller 56 and
30 bearing upon the belt 55 and then over the other conveyer roller 43' and up to the other driving roller 28. Owing to the pressure of the fabric upon the endless belt 55, there will be sufficient friction to cause the belt 55
35 and its roller 56 to rotate, thereby conveying a constant supply of dye from the bath to the fabric, the fabric coming in direct contact with the absorbing belt 55 so as to dye conveniently from side to side and from end
40 to end.

By means of this device, no other tank or vat is necessary to prepare or mix the dye in as the dye may be mixed in the same vat in which the goods are placed.

Hitherto, at the beginning of the operation of dyeing, the fabric is rolled on a wooden roller on a separate machine for that purpose; it is then placed on a shaft which is mounted in a pair of open bearings
50 some distance above the open bearings 29 at the ends of the vat, and then is rolled off on one of the top rollers 28 which have hitherto been stationary on the vat before it can be dyed, which takes up considerable time.
55 When the goods have been dyed and washed, the same process must be gone through before the fabric can be removed from the tub, which likewise consumes a great amount of time.

Referring to Fig. 2, the shaft 27 of the driving roller 28 is provided with a notch 58 which is engaged by means of a spring catch 59 mounted in a recess 60 on the roller 28. By means of this device, the shaft will be
65 held against longitudinal movement. The

goods may be rolled up on this improved roller and placed directly on the dye tub shaft ready for the process of dyeing, thereby no time is lost in rolling off the fabric on the improved dye tub.

It will be seen that by means of this invention, great economy is obtained by saving the steam condensation and using water the second time, since water and steam are used very lavishly in the process of dyeing,
75 washing and bleaching textile fabric.

What I claim is:—

1. In an apparatus of the character described, a vat, driving rollers, and a series of conveyer rollers mounted therein, a motor for operating the driving rollers, a main supply pipe connected with said motor, a discharge passageway from said motor, branch discharge pipes extending from said passageway and projecting into the vat, and
80 a steam pipe entering the vat, extending in undulations over the bottom of the vat, and passing out of the vat to the main supply of the motor.

2. In an apparatus of the character described, a vat, driving rollers, and a series of conveyer rollers mounted therein, a motor for operating the driving rollers, a discharge passageway from said motor, a main supply pipe connected with said motor, branch discharge pipes extending from said discharge passageway, a part of said branch pipes projecting into the vat, a valve controlling the passage of liquid from the motor to said branch pipes, and a steam pipe entering the vat and extending in folds over the bottom of the vat and passing out of the vat to the main supply pipe of the motor.

3. In an apparatus of the character described, a vat, driving and conveyer rollers mounted therein, a motor for operating the driving rollers, a main supply pipe connected with said motor, a discharge passageway from said motor, a pipe joint coupling and valve at the lower end of said passageway, branch discharge pipes extending from said coupling a portion of which project into the vat, a steam pipe entering the vat and extending in folds over the bottom of the vat, and passing out of the vat to the main supply pipe of the motor, and a valve in the steam pipe adjacent to the main supply pipe.

4. In an apparatus of the character described, a vat, driving and conveyer rollers mounted therein, gates located adjacent to two of said conveyer rollers, a main supply pipe connected with said motor, a motor for operating the driving rollers, a discharge passageway from said motor, branch discharge pipes extending from said discharge passageway and projecting into the vat and above said gates and their rollers, and a steam pipe entering the vat and extending in folds over the bottom of the vat, and
130

passing out of the vat to the main supply pipe of the motor.

5 5. In an apparatus of the character described, a vat, driving rollers, and conveyer rollers mounted therein, a pair of hinged gates forming a trough located at each side of the vat and extending from end to end thereof and resting against a conveyer roller, and water discharge pipes projecting into the vat at one end thereof, each pipe projecting between a pair of gates above a conveyer roller.

15 6. In an apparatus of the character described, a vat, conveyer rollers mounted on the upper portion of the ends of the vat, and pairs of gates forming troughs and consisting of longitudinal strips of metal extending from end to end of the vat, each pair of gates being hinged above each of said conveyer rollers, one of said gates resting against the said roller by gravity and the other gate being yieldingly held against said roller.

20 7. In an apparatus of the character de-

scribed, a vat formed with wooden sides, 25 metallic ends elevated above said sides, said sides and bottom being fastened with reinforcing metallic strips, driving rollers and a series of conveyer rollers having their ends mounted in the ends of said vat, a motor for 30 operating the driving rollers, a main supply pipe connected with said motor a steam pipe extending in undulations over the bottom of said vat and connecting the main supply pipe with the motor, branch discharge pipes 35 connected with said motor and with the vat, and also with a point of discharge, means for governing the discharge of water through the discharge pipe, and means for independently closing the connection with 40 the main supply pipe and the steam pipe with said motor.

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

WILLIAM M. ROSSITER.

Witnesses:

LUCIAN H. GUYON,
GEO. E. DEPPEN.