Dec. 12, 1933. A. C. GROSS 1,939,117

MACHINE FOR DYEING YARN, STOCKINGS, AND RAW MATERIALS

Filed Feb. 25, 1932 3 Sheets-Sheet 1

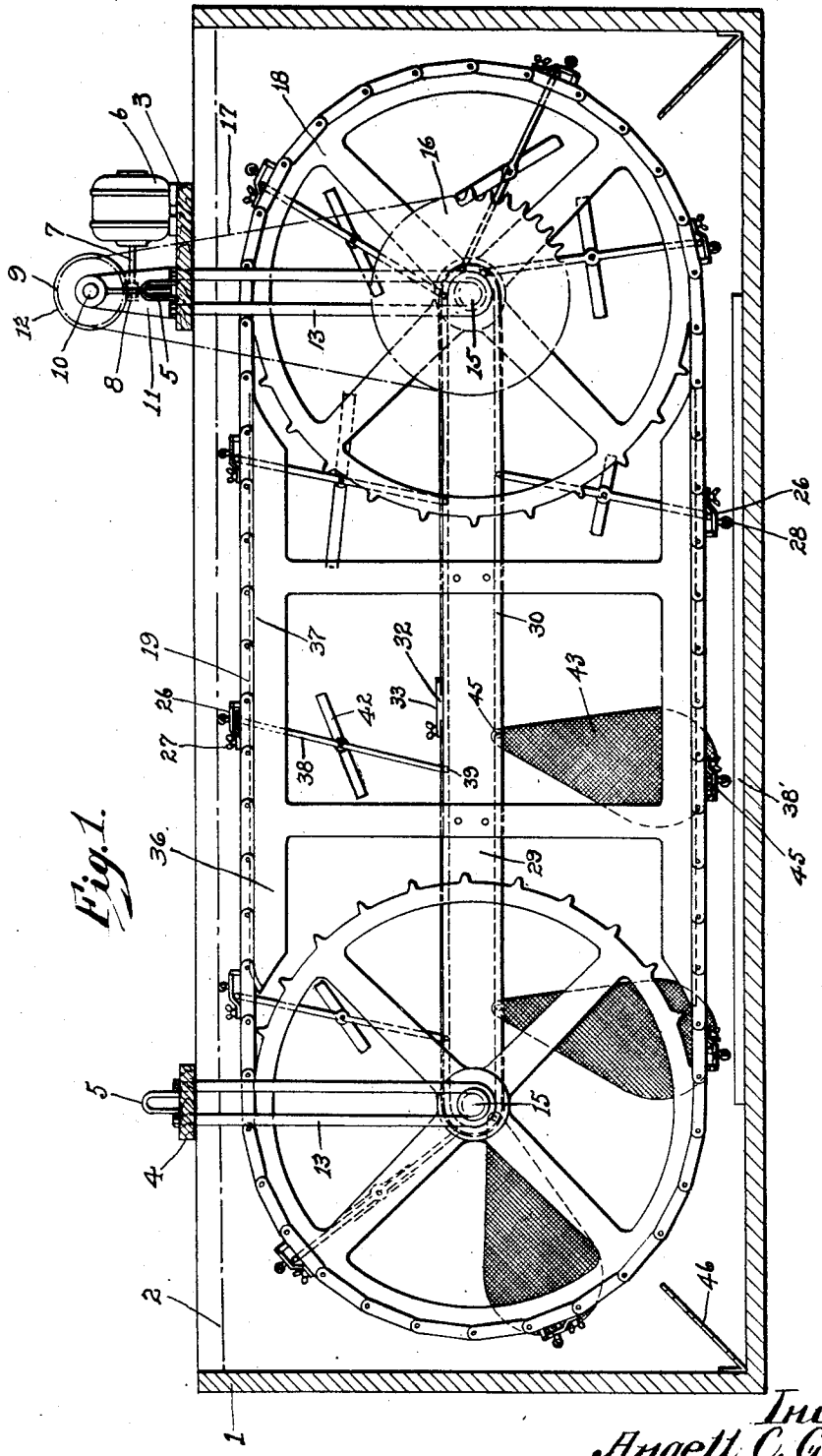


Fig. 1.

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Filed Feb. 25, 1932 3 Sheets-Sheet 2

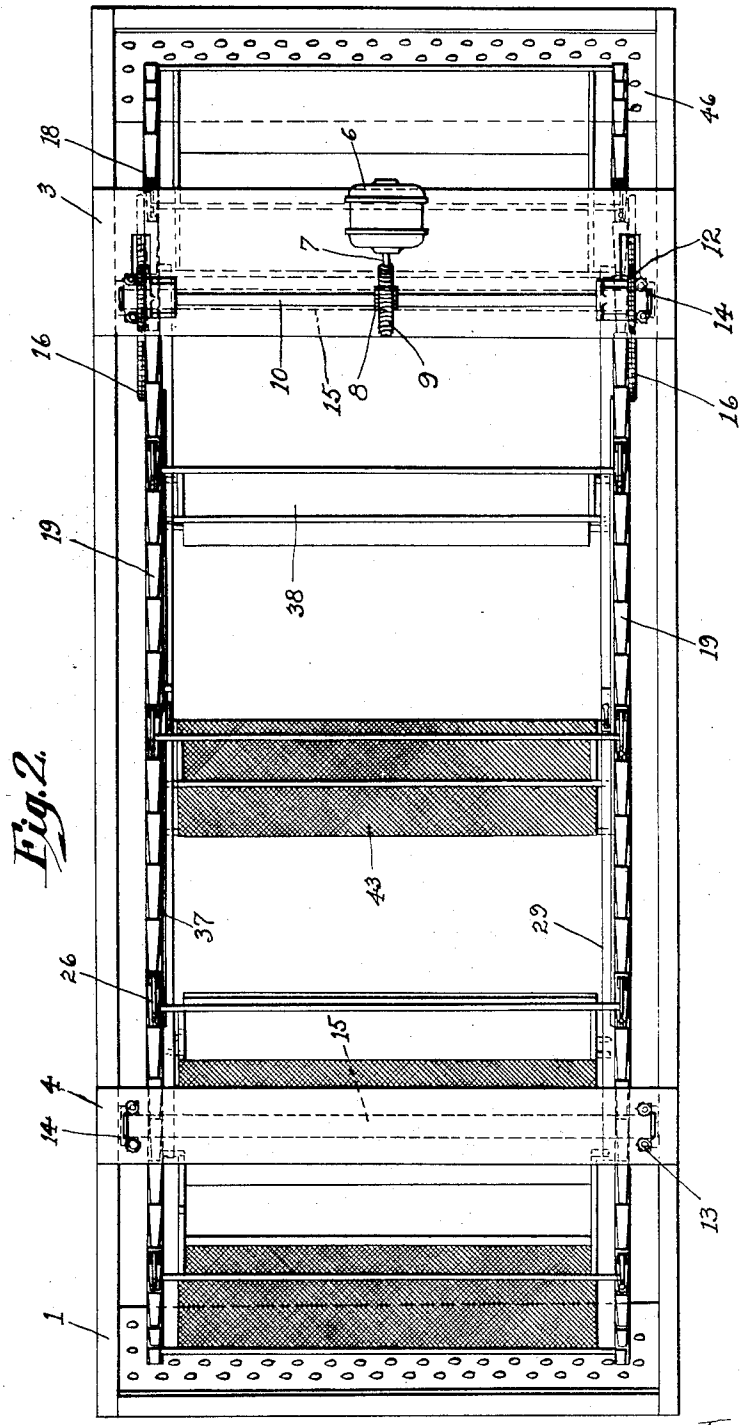


Fig. 2.

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MACHINE FOR DYEING YARN, STOCKINGS, AND RAW MATERIALS

Filed Feb. 25, 1932 3 Sheets-Sheet 3

Fig. 3.

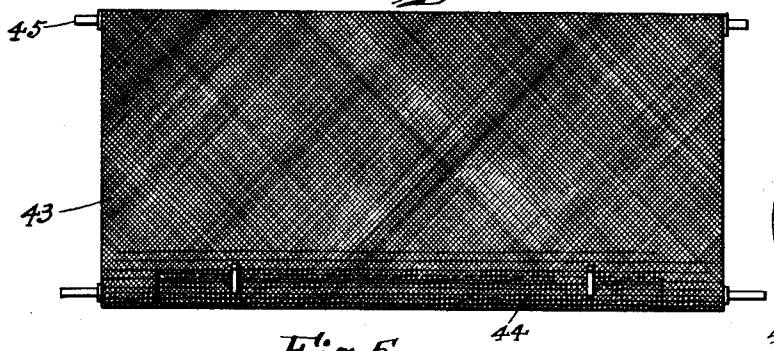


Fig. 4.

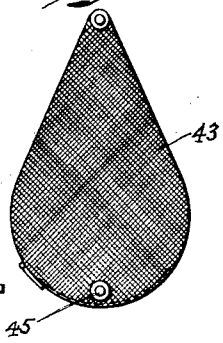


Fig. 5.

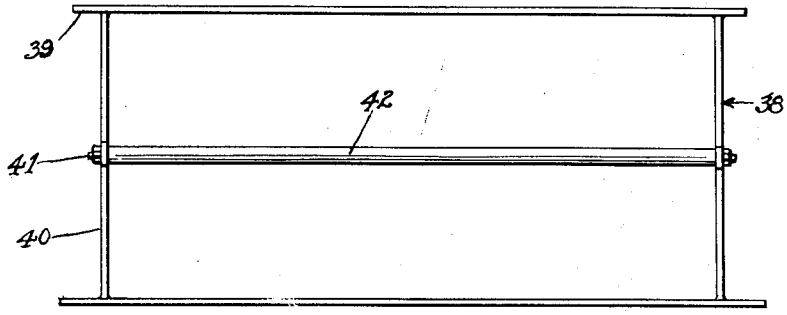


Fig. 6.

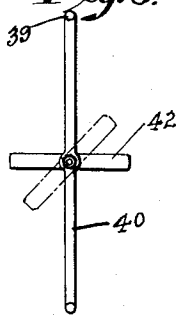


Fig. 7.

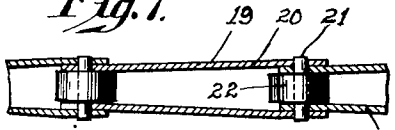


Fig. 8.

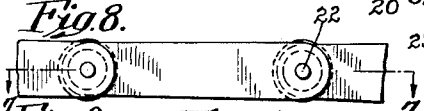


Fig. 9.

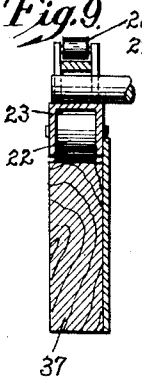


Fig. 10.

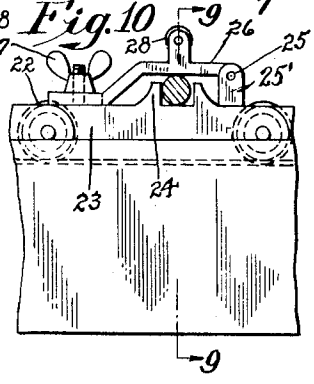


Fig. 11.

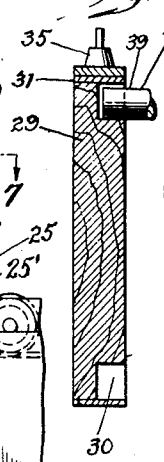
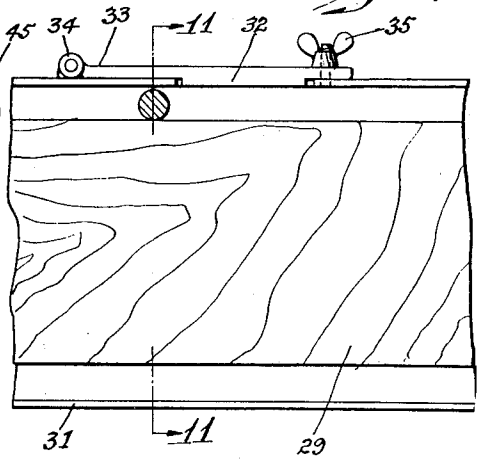


Fig. 12.



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UNITED STATES PATENT OFFICE

1,939,117

MACHINE FOR DYEING YARN, STOCKINGS, AND RAW MATERIALS

Angell C. Gross, Philadelphia, Pa.

Application February 25, 1932. Serial No. 595,130

9 Claims. (Cl. 8—19)

This invention relates to improvements in machines for immersing materials such as yarn, cloth or the like in dyeing solutions and working the same therethrough to effect the dyeing thereof.

The primary object of the present invention is to provide a machine by means of which the material to be dyed is held submerged in and worked back and forth through the dyeing solution so that intimate contact of the solution with all of the fibers of the material is attained and an even dyeing of the material results.

Another object of the invention is to provide a machine of a character to handle material in the form of yarn or finished woven articles such as stockings or the like, the latter articles being carried in baskets into which the dyeing solution may easily pass.

A still further object of the invention is to provide a machine having a novel means for maintaining the yarn carrying members and the article carrying baskets in a fixed upright position while moving the same through the dyeing solution.

A still further object of the invention is to provide a machine of the above described character in which the members carrying the material to be dyed are moved along an endless path in the dyeing vat so as to create a circulation of the dyeing fluid through and about the strands and fibers of the material being dyed.

Still another object of the invention is to provide a dyeing machine in which the mechanism may be completely removed as a unit from the dyeing vat for loading or unloading the material carrying elements or for effecting any necessary repairs in the structure.

The invention also has for an object the provision of a novel means for locking yarn carrying frames and baskets to an endless chain by which they are moved through the dyeing solution.

Other objects and advantages of the invention will become apparent as the description of the same proceeds and the invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:—

Figure 1 is a vertical longitudinal section through the machine embodying the present invention showing the interior mechanism in side elevation;

Figure 2 is a view in top plan of the machine;

Figure 3 is a view in side elevation of one of the article carrying baskets;

Figure 4 is a view in end elevation of the basket;

Figure 5 is a view in side elevation of a yarn carrying frame;

Figure 6 is a view in end elevation of the same;

Figure 7 is a view in longitudinal section of a portion of the frame and basket carrying chain, the section being taken on the line 7—7 of Figure 8;

Figure 8 is a view in side elevation of a portion of the chain;

Figure 9 is a sectional view taken on the line 9—9 of Figure 10;

Figure 10 is a view in side elevation of a portion of a chain support and guide or carrier and a portion of the chain passing therealong;

Figure 11 is a sectional view taken on the line 11—11 of Figure 12;

Figure 12 is a view in side elevation of a portion of the center guide with which the yarn frames and baskets slidably connect.

Referring now more particularly to the drawings wherein like numerals of reference indicate corresponding parts throughout the several views, the numeral 1 indicates generally a tank or vat in which the dyeing solution is placed, filling the vat to the height indicated by the broken line 2. Extending across the top of this vat and supported by the side walls thereof are the two platforms 3 and 4 each of which has secured thereto adjacent each end an eye or loop 5 by means of which a hoisting mechanism may be connected with the platforms and the hereinafter described structure attached thereto for lifting the mechanism of the machine from the vat.

Mounted upon the platform 3 is an electric motor 6, the armature shaft 7 of which carries a worm 8 which meshes with a worm wheel or gear 9 which is supported upon a shaft 10 extending longitudinally of the platform 3 and mounted at its ends in the bearing brackets 11. At each end this shaft 10 carries a sprocket gear 12.

Extending downwardly into the vat 1 from each end of each of the platforms 3 and 4 is a hanger 13 in the lower end of which is a suitable bearing 14 of the thrust type. Mounted in the bearings of the two hangers carried by each plat-

form is a shaft 15 which extends across the tank 1 as illustrated. These shafts are prevented from transverse movement in the tank because of the nature of the bearings 14 in which their ends are mounted.

The shaft 15 lying beneath the platform 3 has mounted thereon adjacent each end, the relatively large sprocket gear 16 which is coupled by means of a suitable sprocket chain 17 with the overlying sprocket gear 12. By this means the shaft 15 is driven or rotated by the motor 6.

Adjacent each end of each of the shafts 15 there is mounted thereon the large sprocket wheel 18 and the sprocket wheels upon one shaft 15 are connected with the adjacent sprocket wheels upon the other shaft 15 by means of the endless chains which are indicated generally by the numerals 19.

These endless chains 19 are of special construction as is shown in Figures 7 and 8 where as will be seen, each of the links is made up of two elongated plates 20 which at one end receive therebetween the ends of an adjacent pair of plates and at the other end are received between an adjacent pair of plates and connection is effected between the ends of the plates 20 of one of the links and the ends of the plates of an adjacent link by means of a pin 21 on which is mounted between the plates the cylinder 22 which serves both as a spacer for the plates of the links and as a supporting roller for the chain as will be hereinafter more fully described. This member will be referred to hereinafter as the roller of the sprocket wheel chain.

Certain of the links of the sprocket wheel chain, such for example as the link indicated by the numeral 23 in Figure 10, have the side plates provided at their top edges with the spaced upstanding ears 24 and at one side of these ears there is hingedly attached to the links by means of the pin 25 and ears 25', the bar 26 which is designed to extend longitudinally of the link to the opposite side of the ears 24 and be secured at its other end to the link by means of the thumb screw 27. This bar 26 carries upon its top side the transversely extending roller 28, the purpose of which will be hereinafter more fully explained.

Mounted between the shafts 15 and supported thereby to extend longitudinally of the dyeing tank are two planks each of which is indicated by the numeral 29 which have their ends rounded as shown in Figure 1 and their inner or adjacent corners cut out to form the grooves 30. The outer sides of these grooves are closed by the band 31 which surrounds the edge of each plank 29, thus forming each groove with one open side only which is directed toward the groove of the opposite plank. At one point along the top edge of each plank the band 31 is broken to form the opening 32 and this opening is normally closed by the bar 33 which is hinged at one end as indicated at 34 to the band and extends across the opening and has its other end detachably secured to the band by means of the thumb screw 35.

Each of the plank bodies 29 carries a frame structure 36 which has as an integral part thereof the two spaced parallel rails 37 each of which has its outer edges disposed adjacent the inner side of one run of an endless chain 19 as shown in Figure 1 with the rollers 22 of the chain moving thereagainst. Each of the rails at the top of the tank thus slidably supports the adjacent run of a chain 19 to prevent the same from sagging.

In the bottom of the tank beneath each chain is a metal track 38' which extends longitudinally of the tank and along which the rollers 28 of the members 26 move should the chain sag in passing along the bottom run.

The numeral 38 indicates generally a frame designed to carry yarn or similar unfinished material through the dyeing tank and at each end of this frame which is of elongated rectangular design, the side bars are extended to form the pins 39. Between the end bars 40 of the frame is oscillatably mounted upon the trunnions 41 the elongated rectangular oscillatory frame 42.

The numeral 43 indicates generally a receptacle formed of a suitable foraminous material and as shown this receptacle in cross section is of greater width adjacent one longitudinal edge than at the other and in the longitudinal edge of greatest width there is provided a door 44 through which articles may be introduced thereinto.

At each end of the receptacle 43 and adjacent each longitudinal edge is a trunnion 45 which extends longitudinally of the receptacle as shown.

In the use of the present machine where formed articles or unfinished woven material is to be dyed, the receptacles 43 are employed, and for yarn or other thread the frames 38 are employed. In order to attach the receptacles and frames to the sprocket wheel chains 19 by which they are moved through the tank, the entire mechanism is hoisted from the tank by lifting the platforms 3 and 4 in the manner previously described and the receptacles and frames are disposed transversely of the chains 19 with the end trunnions adjacent one longitudinal edge engaged in the opposed guide grooves 30 and the trunnions adjacent the other longitudinal edge each secured between a pair of ears 24 by means of the adjacent securing bar 26.

It will, of course, be readily understood that the trunnions first mentioned are inserted in the guide grooves 30 of the central members 29 by shifting the bar 33 so as to permit the trunnions to be slipped into the grooves through the opening 32.

After the frames and receptacles have been mounted between the carrier chains 19 the mechanism is again lowered into the tank and the motor 6 started to cause the frames and receptacles to be carried back and forth along a continuous path in the manner illustrated in Figure 2.

In order that the dye fluid in the tank 1 may be prevented from circulating with the moving frames and receptacles there is disposed in each end of the receptacle and transversely thereof the obliquely directed apertured baffle plate 46. This hinders the circulation of the fluid to a certain extent so that the penetration of the dye fluid into the articles and material to be dyed will be more thorough.

In applying the yarn or other thread-like material to the frames 38 the oscillatable frames 42 are disposed in the same plane as the main frame until after the yarn has been wrapped thereabout after which these oscillatable frames are swung to extend substantially transversely of the main frame and thus stretch the yarn threads and hold them in taut condition.

From the foregoing it will be readily apparent that the frames and receptacles, being attached adjacent one side to the carrier chains 19 and adjacent their opposite sides or edges to the endless center guide groove or track 30, will be carried through the dye vat in such a position that the

dye liquid will be forced to circulate freely through and about the strands of material carried thereby and will thus be completely and evenly dyed.

Having thus described the invention, what is claimed is:—

1. A dyeing machine of the character described comprising a dye liquid receptacle, an endless carrier within the receptacle, means for moving said carrier, a material supporting body designed for connection with the carrier to be moved thereby, and a fixed endless guide having connection with said material supporting body at a remote point from the connection of the latter with said carrier to maintain the latter in a substantially upright position throughout the major portion of its path of movement in the receptacle.

2. A dyeing machine comprising a dye receptacle, a pair of shafts disposed in spaced parallel relation in the receptacle, a pair of sprocket wheels mounted on each shaft, a pair of endless chains each connecting a wheel of one shaft with an adjacent wheel of the other shaft, said chains being in parallel relation, means for rotating one of said shafts, a carrier element for a body to be dyed having a pair of oppositely directed remotely positioned trunnions thereon, means carried by each of said chains to secure one of said trunnions thereto for the support of the carrier body between the chains to be carried thereby in a continuous path through the receptacle, and fixed endless guide means paralleling each of said chains and engaging an adjacent portion of said carrier to maintain the latter in a desired position.

3. In a dyeing machine a receptacle, a pair of shafts disposed in spaced parallel relation in the receptacle, supporting means for the shafts, a pair of sprocket wheels carried upon each shaft, a pair of endless chains each coupling the sprocket wheel of one shaft with the adjacent wheel of the other shaft, said chains being arranged to run in parallel relation, a material carrying body of a character to extend between the chains and having oppositely directed end trunnions, means carried by each chain for releasably securing a trunnion thereto to suspend the body from the chains, a supporting rail disposed beneath the top run of each of said chains and extending longitudinally thereof, elements carried by the chain for engagement with and movement along the adjacent rail, means to provide a fixed endless guide extending longitudinally of the receptacle adjacent the horizontal center thereof, and means carried by the material carrying body for coupling the same with said guide to maintain the body in a predetermined position.

4. A dyeing machine comprising a receptacle, a pair of sprocket wheels in opposite ends of the receptacle, each pair rotating about the same horizontal axis, a fixed endless guide channel extending longitudinally of the receptacle adjacent each side and turning at its ends about the axial center of the sprocket wheels, a pair of endless chains each coupling the sprocket wheel of one pair with the adjacent sprocket wheel of the other pair, a securing means carried by each of said chains, a material carrying body removable from the receptacle and positioned between the chains and having a pair of trunnions formed at each of its two ends, one of the trunnions at each end of the body being secured to a chain by said securing means and the other trunnion at each end being slidably engaged in an adjacent guide channel, and means for rotating said sprocket wheels.

5. A dyeing machine comprising a receptacle, a pair of sprocket wheels rotatably mounted in each of two ends of the receptacle, a pair of sprocket chains each connecting a sprocket wheel of one pair with the adjacent sprocket wheel of the other pair, means to provide a pair of endless guide grooves extending longitudinally of the receptacle adjacent each side thereof and each passing at one end about the axial center of a pair of sprocket wheels, each of said guide grooves having an opening in the upper run thereof, means for closing the opening of each guide groove, means for carrying material to be dyed comprising an elongated body having a pair of outwardly extending trunnions at each end, each of said trunnions being adjacent a longitudinal side of the body, one trunnion of each end of said body being oscillatably connected with the chain, the other trunnion of each end of the body being insertable into the adjacent guide groove through the opening therein, and power means for rotating said sprocket wheels.

6. In a dyeing machine, a vat, hanger members removably suspended therein, a pair of shafts suspended horizontally from said members and in parallel relation for rotation in the vat, a pair of sprocket wheels carried by each shaft, parallel sprocket chains connecting together the pair of sprocket wheels, a pair of elongated flat bodies suspended in parallel relation by and connecting said shafts together, each body having an endless channel passing at each end around a shaft, the channels being in opposed relation, and structures adapted to carry material to be dyed, each having a pair of trunnions slidably engaged in the said endless channels and each further having connection with the chains by which they are moved through the vat.

7. In a dyeing machine, a vat, hanger members removably suspended therein, a pair of shafts suspended horizontally from said members and in parallel relation for rotation in the vat, a pair of sprocket wheels carried by each shaft, parallel sprocket chains connecting together the pairs of sprocket wheels, a pair of elongated flat bodies suspended in parallel relation by and connecting said shafts together, each body having an endless channel passing at each end around a shaft, the channels being in opposed relation, structures adapted to carry material to be dyed, each having a pair of trunnions slidably engaged in the said endless channels and each further having connection with the chains by which they are moved through the vat, and a frame structure carried by each of said bodies, including a pair of elongated elements each having a run of a chain passing therealong.

8. In a dyeing machine including a vat having endless chain carrying sprockets and a chain track therein, an endless chain supported by said sprockets for moving through the vat, material carriers having supporting trunnions, an ear member carried by each of certain links of said chain, a bar pivotally attached at one end to each of said ear members and having a portion of its other end off-set whereby when the off-set end is brought into contact with the adjacent link the intermediate portion will be spaced therefrom, and means for securing the off-set portion of each bar to the adjacent link, said material carriers being designed to have each of the trunnions thereof secured between a bar and the link adjacent thereto.

9. In a dyeing machine including a vat having endless chain carrying sprockets and a chain track therein, an endless chain supported by said sprockets for moving through the vat, material carriers having supporting trunnions, an ear member carried by each of certain links of said chain, a bar pivotally attached at one end to each of said ear members and having a portion of its other end off-set whereby when the off-set end is brought into contact with the adjacent link the intermediate portion will be spaced therefrom, and means for securing the off-set portion of each bar to the adjacent link, a pair of spaced members formed integral with the link adjacent each bar and having the said bar extending across the ends thereof, said material carriers being designed to have each of its trunnions disposed between a pair of spaced members to be retained in such position by the adjacent bar.

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