

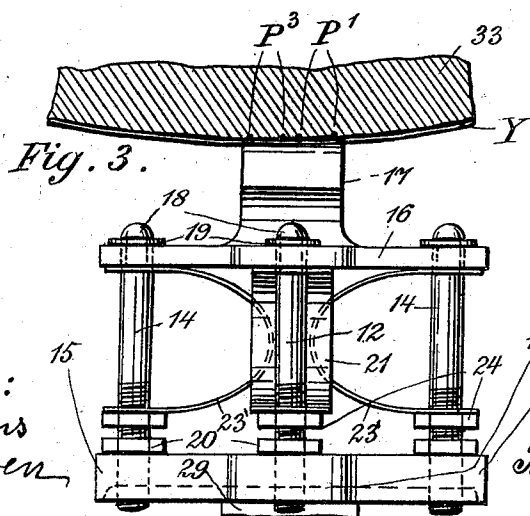
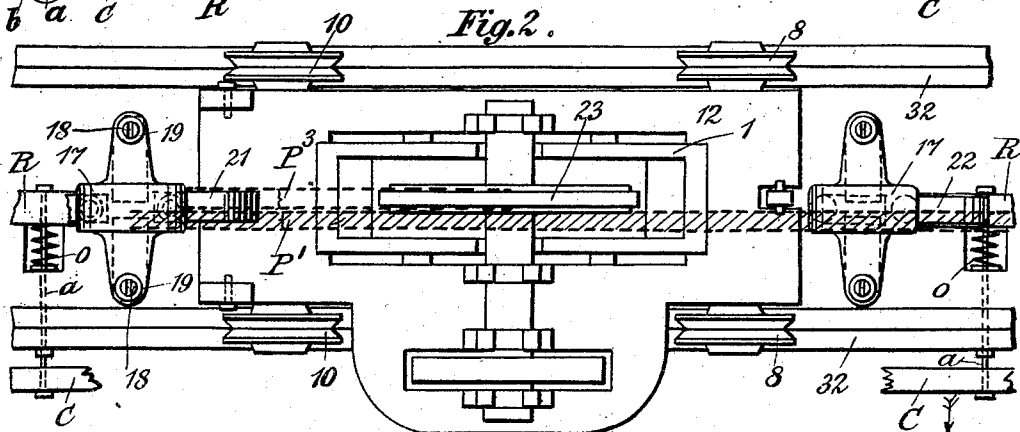
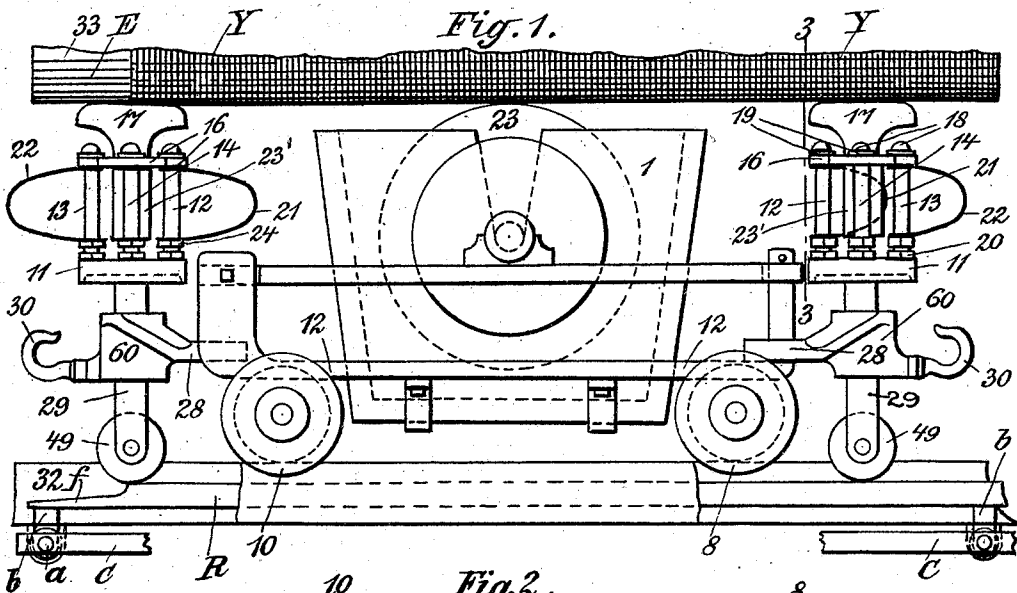
No. 683,228.

Patented Sept. 24, 1901.

W. SHAW.  
APPARATUS FOR COLORING YARNS.

(Application filed Sept. 10, 1897.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

WILLIAM SHAW, OF BROOKLYN, NEW YORK.

## APPARATUS FOR COLORING YARNS.

SPECIFICATION forming part of Letters Patent No. 683,228, dated September 24, 1901.

Application filed September 10, 1897 Serial No. 651,161. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM SHAW, a citizen of the United States, and a resident of the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Apparatus for Coloring Yarns, of which the following is a specification.

My invention refers to apparatus for coloring yarns, and more particularly yarns used in the manufacture of tapestry and velvet carpets.

The objects of my invention are to provide a suitable apparatus for applying coloring-matter to yarn and for spreading and forcing such coloring-matter along, into, and through the yarn and to thereby distribute such coloring-matter in approximately uniform manner, whereby particularly, also, after the yarn shall have been subjected to the usual steaming and scouring processes and after having been woven into a fabric portions of threads of the same shade may be made to appear substantially uniform.

Further objects are to so adjust the spreading or rubbing appliances employed with reference to each other that the same, while thoroughly independent of each other in their operations, shall serve to place the threads of the yarn in the most suitable positions for receiving the coloring-matter and for equalizing the same; also, to give such forms and supports to said spreading or rubbing appliances as to be most suitable for the performance of their work.

In employing apparatus as more fully described hereinafter I avail myself of the tendency of the liquid color to spread laterally beyond the sides of a streak previously applied and to the fact that by spreading liquid or semiliquid coloring-matter from a printed portion of the yarn laterally upon adjoining white yarn previous to printing thereon such yarn is rendered more capable of absorbing the coloring afterward printed upon it.

My apparatus is employed in successively applying streaks of coloring-matter crosswise to the threads of yarn side by side and after printing the first streak in a series of streaks and during the printing of the second streak subjecting the full width of the first streak to two simultaneous and preferably sliding

rubbing actions and by one of said rubbing actions spreading color from said first streak into the space corresponding with the yet unprinted portion of the second streak, subjecting the color while being so forced over to pressure and preferably to sliding pressure, then completing said second streak by printing upon the unprinted space adjoining the first streak which has received such coloring-matter and simultaneously rubbing the printed portion of said second streak, thus during the printing of a single streak applying color to that portion of the yarn which is to be printed upon subsequently in advance of said printing operation and at the same time performing the rubbing under pressure of three portions of the yarn, the width of each one of which corresponds with the width of at least one streak. Thus provision is made to perform with reference to all the interior streaks in a series of adjoining streaks a preliminary coloring and rubbing of the yarn where such a streak is to be applied, as well as the subsequent printing of the same and a threefold subsequent rubbing of it.

The objects of my invention are accomplished by the means hereinafter specified and set forth more particularly in the claims.

In the accompanying drawings, forming part of this specification, and wherein like letters and figures of reference refer to corresponding parts, Figure 1 is a side elevation of a color-carriage and part of the yarn-drum fitted up according to my invention, while Fig. 2 is a ground plan of the apparatus illustrated in Fig. 1, the yarn-drum, however, not being shown therein. Fig. 3 is a vertical section, on an enlarged scale, along line 3 3 in Fig. 1, looking toward the right.

12 is the color-carriage mounted on wheels 8 8 and 10 10, on which color-box 1 and color-wheel 23 are supported and which is drawn by means of a cord attached to hooks 30 forward and backward along rails 32, placed underneath and parallel with drum 33, carrying the yarn Y. 28 28 are brackets attached to the main body of the carriage and carrying a vertical arm 60, which forms a bearing, within which a post 29, made of rectangular cross-section, is made to slide. All these parts substantially correspond in their mutual relations and functions with the parts

bearing corresponding letters of reference in my United States Letters Patent No. 543,512. Thus, as explained in said patent, the effect of drawing the coloring-wheel along the yarn, as described, will be the production of a "streak" of coloring-matter upon the yarn slightly exceeding in width the face of said wheel and comprising two ridges of coloring-matter directly adjoining the path of such face of said wheel, while the space between such ridges will be covered by coloring-matter, but not as heavily. It is the proper lateral distribution of color comprised in said ridges and the rubbing into the yarn of color on any part of its surface which is accomplished by my improved spreading and rubbing appliances hereinafter described, the construction and arrangement of said appliances also having reference to the fact that a single application of the spreaders or rubbers to such a ridge under the pressures which it is safe and best to impart to said appliances will ordinarily not be sufficient to accomplish proper lateral distribution of the color forming such a ridge, but will leave there or in its immediate vicinity a surplus of color on the face of the yarn, for the proper lateral distribution of which a second spreading and rubbing operation is required.

49 49 are rollers near the lower extremities of posts 29. 11 11 are platforms at the upper extremities of posts 29. 12 is a cylindrical vertical stud screwed into the end of such a platform nearest to the color-wheel, and 13 such a stud screwed into its opposite end, while 14 14 represent similar studs screwed into lugs 15, extending laterally from platform 11.

16 is a base from which springs a spreader or rubber 17, attached thereto. Said base is substantially of the same ground plan as platform 11, with its connecting-lugs, and receives the upper ends of studs 12, 13, and 14 in such manner that said base is capable of playing freely upward and downward along said studs. 18 18 are screws entering the heads of said studs and serving, by means of washers 19, to prevent base or platform 16 from leaving said studs.

20 indicates jam-nuts.

The upper surface of spreader or rubber 17 is shaped symmetrical with reference to its longitudinal and lateral axes, flat in its central portion, and curving downward in the directions toward and away from the color-wheel, so as to make the rubbing-surface of the rubber contact with the yarn first in front and last in the rear along substantially straight lines, and studs 12, 13, and 14 are placed symmetrical with reference to said axes.

21 and 22 represent leaf-springs of equal strength and resilience, the former mounted on studs 12 and the latter on studs 13, while 23 23 represent leaf-springs on studs 14 14, so proportioned that greater resistance will be offered to vertical depression of the cen-

tral portion of spreader or rubber 17 than to depression of its end. Where the spring-pressures applied to spreaders or rubbers where they first come in contact with the yarn are as great as those applied to those portions of their surfaces which contact with the yarn later, any displacement of the yarn on the drum produced by such contact will generally be produced where such contact first takes place. The upward pressure exerted by springs 23 being greater than the pressure exerted by either spring 21 or 22, it will be seen that as the flat rubbing-surfaces of rubbers 17 pass over the yarn the pressures on the yarn so treated will be increased gradually, and as such pressures are directed at right angles to the surfaces on the drum which support such yarn it will be seen that displacement of the yarn along the drum and the inequalities in the coloring of the yarn which would be caused by such displacements are guarded against. Besides, the forcing of color into the printed yarn, as well as upon and into the white yarn, will be accomplished very efficiently and thoroughly where the pressure increases and is applied at right angles to the surfaces supporting the yarn, and more so than where such pressures are applied in any other manner or direction. The upper ends of said springs are permitted to play freely along their corresponding studs. 24 24 are nuts for properly adjusting the initial tension of said springs. By this arrangement of the springs and the spreaders or rubbers the latter may pass underneath the end of the drum without catching thereon or on the oil-cloth covering the same.

By making the top surfaces of the spreaders or rubbers 17 flat, as described, and gradually sloping downward in front and in the rear, as shown, I cause said spreaders or rubbers to bear upon or contact with the yarn first in front and last in the rear along straight lines parallel with each other, the flat rubbing-surface between said straight lines normally held in contact with the yarn by spring-pressure being of the same length and width throughout. I thereby gain the advantage of getting simultaneous uniform rubbing actions over corresponding portions of the yarn on the drum operated upon by the rubber and of preventing the pushing out of place of the yarn on the drum, which is apt to occur where the first contact with it of the front bearing of the rubbing-surface of the rubber takes place in a straight line only across part of the path of its whole rubbing-surface. Besides, by making the line of first contact straight, as described, I insure uniform distribution of the color laterally over and into the yarn, particularly, also, where very thin color is employed, which readily enters into the yarn, in which case it is not necessary to dish out portion of the upper surface of the rubber for the purpose of carrying along surplus coloring-matter until a portion of the yarn is reached capable of absorbing the same.

Rollers 49 are adapted to travel on rail R, placed between track-rails 32 32.

*a a* are rods attached to lugs *b* on rail R and connected to a beam C in such a manner that by moving said beam in the direction of the arrow in Fig. 2 said rail will be withdrawn laterally from contact with rollers 49, springs *o o* forcing said rail back into its original position when the sideward thrust on beam C ceases.

Any other means—for instance, such as shown for a like purpose in my United States Patent No. 514,282—may be substituted for those above described, whereby rollers 49 may be temporarily deprived of their support, so as to cause the weight of the spreading or rubbing devices and of their movable supports to drop to elevations below the drum, thereby keeping the same from contact with the yarn. Thus the passage of the spreading or rubbing appliances over the outer ridges of outer streaks in a series of streaks of the same shade can be prevented and the forcing of coloring-matter into an adjoining streak of different shade can be guarded against.

The ends of center rail R are provided with slopes *f*, becoming more abrupt as they approach the drum, so as to properly guide the spreading or rubbing appliances and their movable supports toward the portion of the drum where the spreader or rubber is intended to first come in contact with the yarn and away from that portion where it is to leave such yarn. Underneath the portion of the drum covered by the yarn both spreaders or rubbers are held in contact therewith, and as they are so located that the rear one will cover the streak *P*<sup>3</sup> in course of application and the one ahead of the color-wheel the space to be covered by such streak *P*<sup>3</sup>, while both are made to cover the streak *P*<sup>1</sup> previously made, as shown more particularly in Fig. 2, it will be seen that thereby each streak (except the outer ones of a series of streaks) almost immediately after being printed is subjected to three rubbing actions, one of which is in the direction in which the color-wheel has been traveling, while the other two are in the opposite direction, while also coloring-matter from the streak previously made is moved into the path of the color-wheel, thus moistening the yarn and rubbing it in the direction in which the color-wheel travels, and thereby preparing that portion of the yarn which is to be printed upon next to receive the color to be applied to it by the color-wheel. By applying such repeated spreading and rubbing actions to the yarn after it has received coloring-matter I am enabled to conduct the rubbing appliances along the drum under comparatively slight spring-pressure, which has a tendency to preserve the yarn. As shown in Fig. 2, the extent to which the drum is being swung between the making of successive streaks and the widths of the color-wheel and of the streaks produced are such as to leave a slight space between ad-

joining streaks which are filled out by the lateral displacement of the color produced by the action of the rubber and to also have the rubbers overlap the streak which is in course of application in the direction toward the portion of the white yarn which is to subsequently receive the next adjoining streak, so as to spread the color there over the white yarn next adjoining such streak in course of application.

What are the front portions of the spreaders or rubbers while said appliances are traveling in one direction become their rear portions when the movement takes place in the opposite direction. In making the rear bearings along the rear ends of the operative surfaces of the rubbers rounding at least to some degree the advantage is gained that all danger of cutting the yarn while said rear bearing passes over it is done away with, which danger is encountered where sharp rear bearing edges are employed, and particularly where such edges extend over yarn to be printed upon subsequently and where the yarn therefore has not as yet been subjected to pressure toward the drum and to the application to it of liquid color which occur during a printing operation and which tend to smooth the yarn, and to thereby make it less liable to be cut by such rear edge.

It will be seen that various features and details of the apparatus described above might be modified and that particularly the spreaders or rubbers might be shifted laterally to some extent without departing from the spirit of my invention or losing benefits derived from it, as set forth above.

I am aware of the contents of Charles L. Horack's application, Serial No. 632,195, for United States patent for methods of and apparatus for printing carpet-yarns and do not claim herein any of the features claimed in said application.

Having claimed, broadly, in my application, Serial No. 658,815, filed November 17, 1897, now pending before the Patent Office, in apparatus for printing yarns by applying successive streaks of color thereto, the combination, with the printing-wheel, of a spreader constructed and positioned to act upon the ridge of color left at the side of the streak in course of application next to the unprinted portion of the yarn and to overlap and to act upon a portion of the unprinted yarn laterally outside of said ridge, so as to distribute the color laterally beyond its deposition on the yarn and upon the unprinted yarn to which the next streak of color is to be applied, I do not claim said apparatus herein, nor any modification thereof, except as set forth in the annexed claims.

I claim as new and desire to secure by Letters Patent—

1. In an apparatus for printing or coloring yarns or similar material, the combination with the color-wheel, of a spreader or rubber having a substantially straight bearing along

the front of its operative spreading or rubbing surface, the surface in front of such bearing gradually deflecting downward from the rubbing-surface, such straight bearing being constructed and positioned to act upon color at the side of a printed portion of a streak next to an unprinted portion of the yarn and to overlap and act upon a portion of the uncolored yarn laterally outside of said colored portion which is to be printed upon subsequently, and means for applying lighter pressure to portion of the rubbing-surface directly adjoining the front bearing than is applied to portion of the rubbing-surface in the rear thereof, said pressures being applied in directions at right angles to the drum.

2. In an apparatus for printing or coloring yarns or similar material, the combination with the color-wheel, of a spreader or rubber positioned to act upon color at the side of a printed portion of a streak next to an unprinted portion of the yarn laterally outside of said colored portion and which is to be printed upon subsequently, said spreader or rubber having a rounding rear bearing extending over such unprinted portion of the yarn, and means for holding the front portion of the rubbing-surface against the yarn under lighter pressure than is imparted to portion of the rubbing-surface in the rear thereof.

3. In apparatus for printing or coloring yarns, the combination with the yarn-drum and the distributing-wheel, of a rubbing appliance in front and another rubbing appliance in the rear of said wheel, each rubbing appliance adjusted to extend over the path of the color-wheel which the same has to follow in making the streak in course of application and over the preceding streak, proper supports adapted to enforce contact of said appliances with the yarn simultaneously, and means for keeping said rubbing appliances

out of action simultaneously, substantially as specified.

4. In apparatus for printing carpet-yarns, the combination with the yarn-drum and the distributing-wheel, of a rubbing appliance in front and another rubbing appliance in the rear of said wheel, each rubbing appliance adjusted to extend over the path of the color-wheel which the same has to follow in making the streak in course of application and over the preceding streak, proper supports adapted to enforce contact of said appliances with the yarn simultaneously, and means for keeping said rubbing appliances out of action simultaneously, substantially as specified.

5. In apparatus for printing carpet-yarns, the combination with the yarn-drum and the distributing-wheel, of a rubbing appliance adapted to travel in contact with the yarn in front and in the rear of the distributing-wheel, a spring on each side of the central portion and a spring supporting the front portion and another the rear portion of the rubbing appliance, substantially as specified.

6. In apparatus for printing carpet-yarns, the combination with the yarn-drum and the distributing-wheel, of a rubbing appliance adapted to travel in contact with the yarn in front and in the rear of the distributing-wheel, springs for supporting its forward end, its rear end and the intermediate portion, the elastic upward pressure so exerted being greater upon the intermediate portion than upon the end portions, substantially as specified.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 2d day of August, 1897.

WILLIAM SHAW.

Witnesses:

CHAS. L. HORACK,  
HENRY E. JOËL.