

No. 683,229.

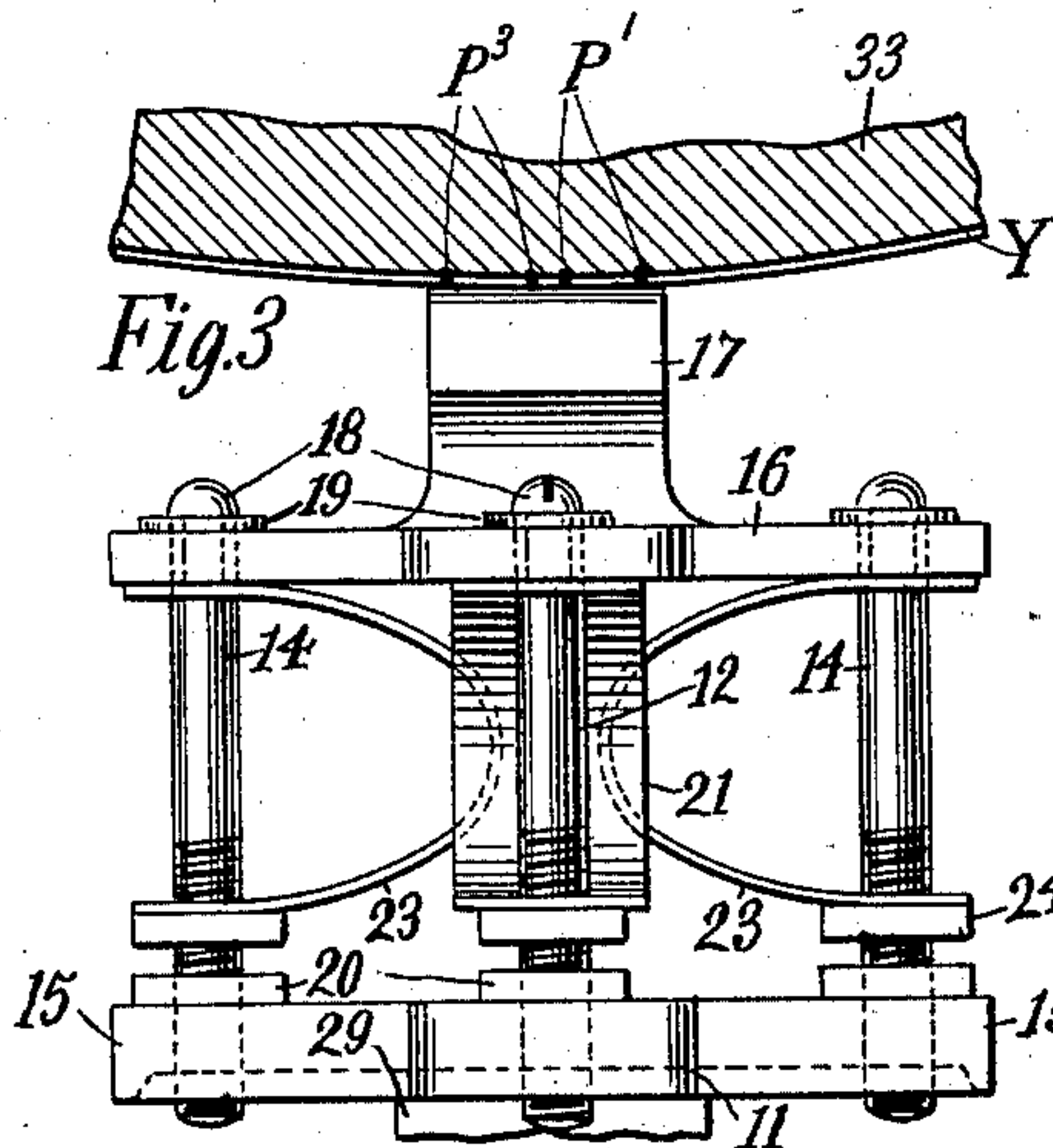
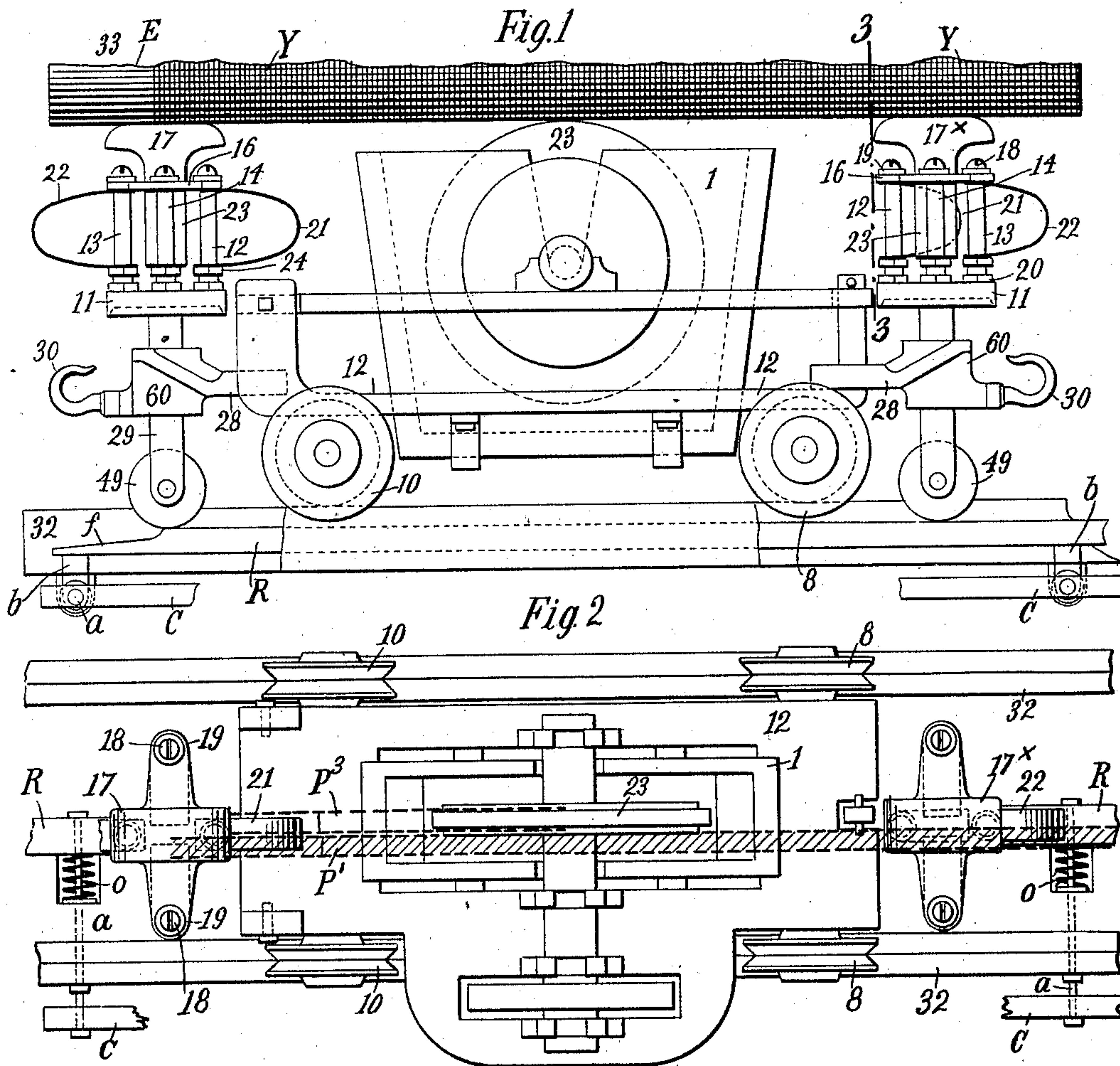
Patented Sept. 24, 1901.

W. SHAW.  
METHOD OF COLORING YARNS.

(Application filed Nov. 16, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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2 Sheets—Sheet 2.

Fig. 4.



Fig. 5.

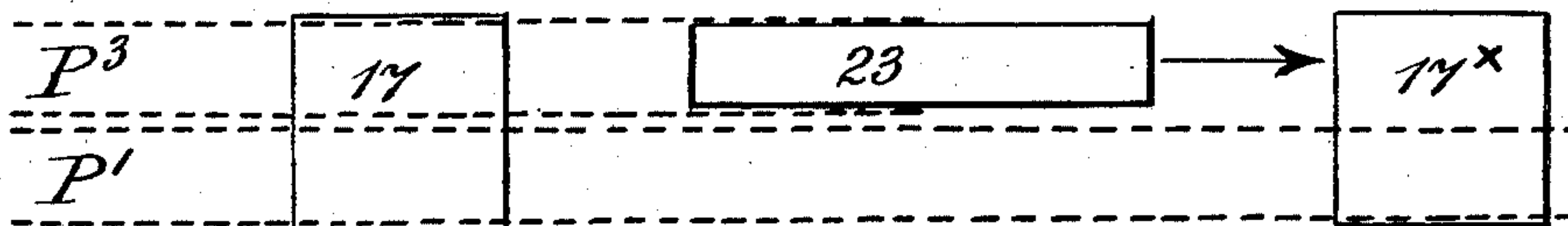
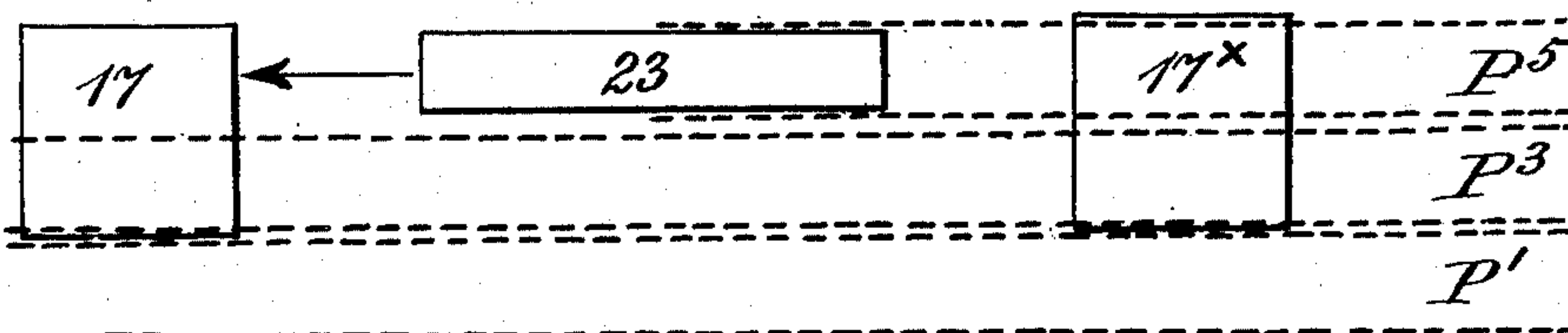


Fig. 6.



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# UNITED STATES PATENT OFFICE.

WILLIAM SHAW, OF BROOKLYN, NEW YORK.

## METHOD OF COLORING YARNS.

SPECIFICATION forming part of Letters Patent No. 683,229, dated September 24, 1901.

Original application filed September 10, 1897, Serial No. 651,161. Divided and this application filed November 16, 1900. Serial No. 36,700. (No specimens.)

*To all whom it may concern:*

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

This application is a subdivision of and covers subject-matter originally contained in my application for patent for improvements in methods of and apparatus for coloring yarns filed September 10, 1897, Serial No. 651,161.

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

My improved method is capable of being carried out wholly or partly by means of appliances actuated directly by the hands of the operators or by mechanical or automatic means superintended and directed in general only by the operator. In the latter case I prefer to employ an apparatus as now commonly used in printing such carpet-yarns, which consist of a drum around which the yarn is wound and a color-carriage with color-wheel adapted to apply streaks of color to the yarn side by side while traveling underneath the drum and to apply thereto the structural improvements above referred to.

The objects of my invention are to provide suitable methods 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 thread of the same shade may be made to appear substantially uniform.

In my improved method, as exemplified more fully hereinafter, I avail myself of the tendency of the liquid color to spread laterally beyond the sides of a streak previously applied and of the fact that by spreading liquid or semiliquid coloring-matter from a printed portion of the yarn laterally upon ad-

joining white yarn previous to printing thereon such yarn is rendered more capable of absorbing the color afterward printed upon it.

My improved method consists in various successive steps in the coloring of yarns, as hereinafter set forth, and specified particularly in the claims, and particularly also in steps taken 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.

My improved method also consists in rubbing color from a streak previously printed over adjoining unprinted yarn and then printing upon the unprinted yarn to which color has been so transferred and applying progressively-increasing pressures during such rubbing operations substantially at right angles to the surfaces along which the yarn is supported and in doing so performing the rubbing operations in such manner that rubbing action will first be imparted to the yarn along straight lines running substantially at right angles to the direction in which the rubbing



action takes place and substantially parallel with the threads of the yarn.

The objects of my invention can be accomplished by the means hereinafter specified or by other suitable means, as mentioned above.

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 33 in Fig. 1 looking toward the right. Figs. 4, 5, and 6 are diagrams indicating the directions in which the color-wheel travels in making successive streaks, Figs. 5 and 6 also showing the positions of the rubbers with reference to said streaks and to the color-wheel while a second and a third streak are being printed.

12 is the color-carriage, mounted on wheels 8 8 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. The wheel applies streaks of color to the yarn on the drum in usual manner while traveling underneath the latter in either direction, so that alternate streaks are applied in opposite directions. 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 characters of reference in my United States Letters Patent No. 543,512.

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 16 are bases from which rubbers fixedly attached thereto extend upward. The rubber on the left-hand side of the color-wheel in Figs. 1 and 2 is indicated by 17 and that on the right-hand side by 17<sup>x</sup>. The two rubbers are constructed and mounted alike. Each such 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 the base or platform 16 from leaving said studs.

20 represents jam-nuts. The upper surface

of 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 parallel 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 central portions of rubbers 17 and 17<sup>x</sup> than to depressions of their ends. 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 rubbers the latter may pass underneath the end of the drum without catching thereon or on the oil-cloth covering the same. 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, 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 displacement 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 directions. 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 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 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.

In Figs. 4, 5, and 6 the directions in which the color-wheel and the rubbers travel are indicated by arrows. Fig. 4 represents the color-wheel while applying the first streak  $P'$  of a series of streaks, the two rubbers being held out of operative contact with the yarn. Fig. 5 indicates the positions of the color-wheel and rubbers while the second streak  $P^3$  is being printed, and therefore illustrates the same conditions as are illustrated in Fig. 2, wherein rubber  $17^x$ , traveling ahead of the color-wheel, covers streak  $P'$  previously printed and extends over that portion of the yarn which is to receive the continuation of streak  $P^3$ , while rubber 17, in the rear of the color-wheel, also covers streak  $P'$  and in addition the streak  $P^3$ , which has just been applied by the color-wheel. It will be seen that, as indicated above, during the printing of the second streak rubbing under pressure takes place of three portions of the yarn, the width of each one of which corresponds with the width of at least one streak—viz., of two portions of the yarn each of which is covered by streak  $P'$  and of one portion of the yarn covered by streak  $P^3$ . Fig. 6 shows the color-wheel applying the next streak  $P^5$ , while rubber 17, which travels ahead of said wheel, covers streak  $P^3$  and the portion of the yarn to which the continuation of streak  $P^5$  is about to be applied, and rubber  $17^x$ , in the rear of said wheel, covers both streaks  $P^3$  and  $P^5$ , rubbing action thus again being applied to an equal number of portions of yarn of the width of a streak, as described with reference to Fig. 5. It therefore appears that 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 rubbings 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. 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 rubbing appliances and their movable supports toward the portions of the drum where the rubbers are intended to first come in contact with the yarn and away from the portions where they are to leave such yarn. In so constructing the operative surface of the rubber as to make it contact with the yarn first in front and last in the rear along substantially straight lines placed parallel with the direction in which the threads of the yarn are wound upon the drum I also guard against displacement of the yarn along its supports during the printing operation and in addition impart uniform rubbing to all the parts of the yarn over which the rubber travels.

Having claimed, broadly, in application Serial No. 658,815, filed November 17, 1897, now pending before the Patent Office the method of printing and distributing color upon yarn or similar material which consists in applying a streak of color to the yarn and subjecting simultaneously the edge of one streak of color next the unprinted yarn and a portion of the unprinted yarn at the side of the said streak to a rubbing operation, so as to distribute the color from said streak laterally beyond its deposition on the yarn and upon the unprinted yarn, and subsequently applying a streak of color upon the unprinted yarn upon which color has been so distributed, I do not claim said method herein nor any modifications thereof, except as set forth in the annexed claims.

I claim—

1. The improvement in the art of coloring yarns, which consists in successively printing streaks of color of given widths upon the yarn side by side, and subjecting during the printing of a streak the whole width of the previous streak to a rubbing action together with the unprinted yarn to be covered by the streak in course of application, thereby forcing coloring-matter from such previous streak into the area to be covered by said streak in course of application, extending the streak in course of application to the space upon which coloring-matter had been so spread, and simultaneously subjecting the whole width of the printed portion of the streak in course of application to a rubbing action.

2. The method of printing and distributing color upon yarn or similar material, which consists in applying a streak of color to the yarn and subjecting while said streak is still in wet condition, and while the yarn is properly supported, that edge of it which is next the unprinted yarn and a portion of the unprinted yarn at the side of said edge to a rubbing operation so as to distribute color from said edge laterally beyond its deposition on the yarn and upon the yarn upon which the next streak is to be printed, while subjecting during such rubbing operation the yarn so treated to progressively-increasing pressures exerted at right angles to the sur-



faces along which such yarn is supported, and subsequently applying a streak of color to the unprinted yarn upon which color has been so distributed.

- 5 3. The method of printing and distributing color upon yarn or similar material, which consists in applying a streak of color to the yarn and subjecting while said streak is still in wet condition and while the yarn is prop-  
10 erly supported, that edge of it which is next the unprinted yarn and a portion of the yarn at the side of said edge to a rubbing operation so as to distribute color from said edge laterally beyond its deposition on the yarn  
15 and upon the yarn upon which the next streak is to be printed, while subjecting during such

rubbing operation the yarn so treated to progressively - increasing pressures exerted at right angles to the surfaces along which such yarn is supported, and subsequently apply- 20 ing a streak of color to the unprinted yarn upon which color has been so distributed, the front edges of the yarn-surfaces which are thus simultaneously subjected to rubbing actions being substantially straight. 25

Signed at New York, in the county of New York and State of New York, this 15th day of November, A. D. 1900.

WILLIAM SHAW.

Witnesses:

CHAS. L. HORACK,  
JAMES McLAIN.