Aug. 22, 1961 W. McDOWELL ARMSTRONG 2,996,873

METHOD FOR PRODUCING MULTI-COLORED SINGLE YARN

Filed Nov. 7, 1958 2 Sheets-Sheet 1

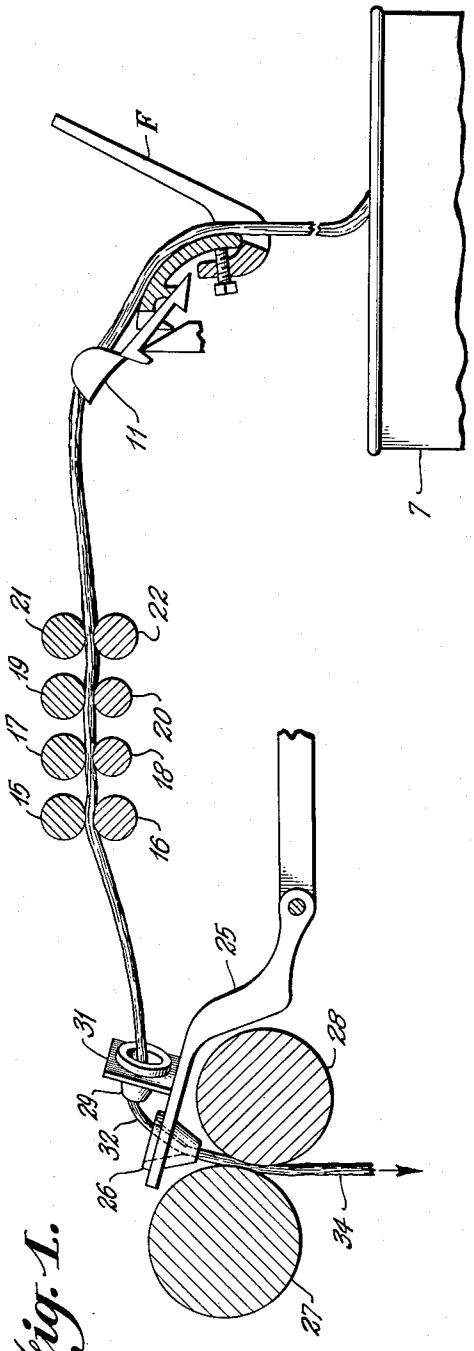


Fig. 1.

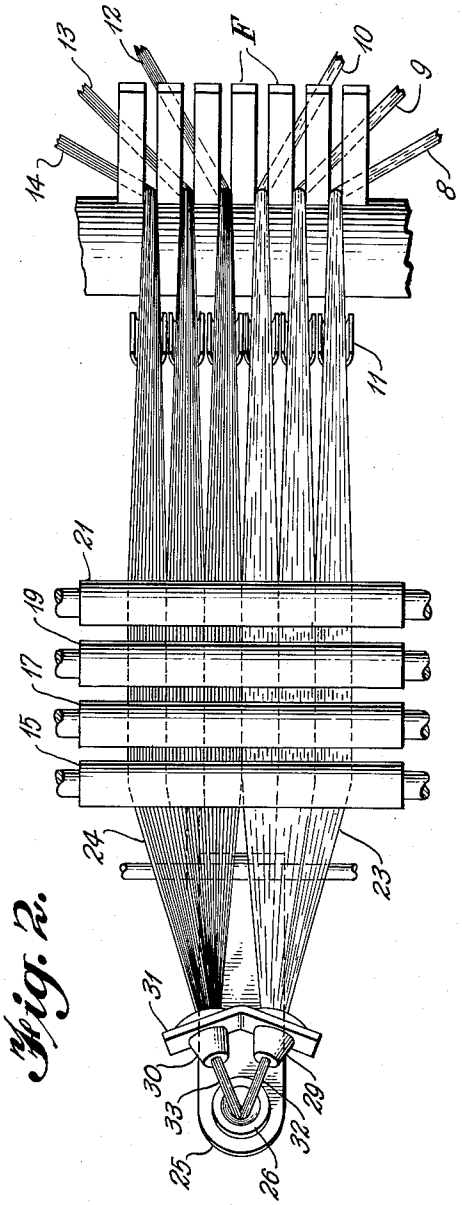


Fig. 2.

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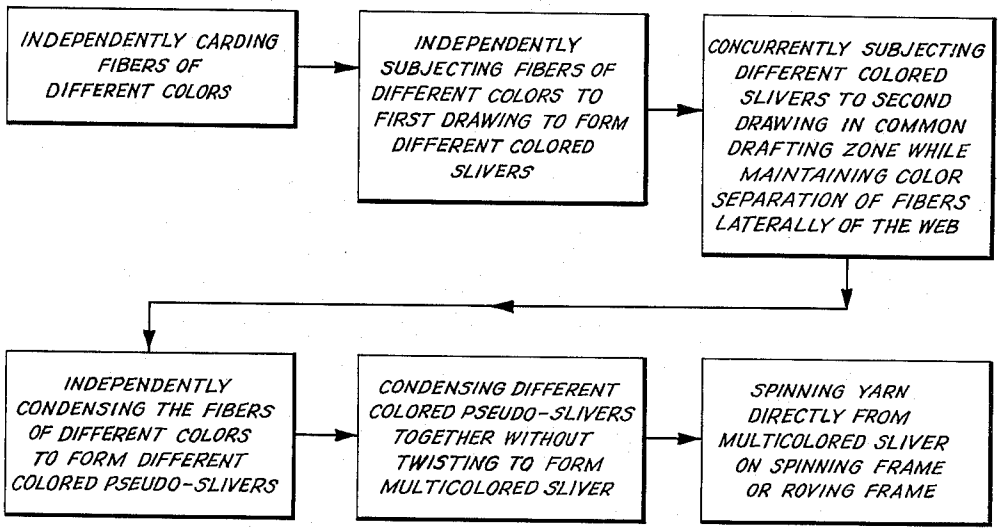
Aug. 22, 1961 W. McDOWELL ARMSTRONG 2,996,873

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2 Sheets-Sheet 2

Fig. 4.



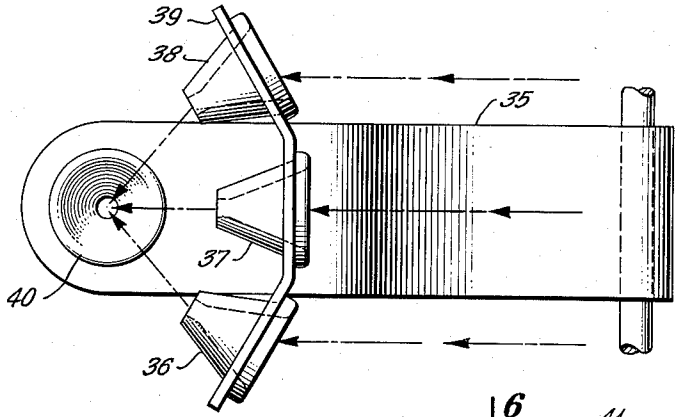


Fig. 3.

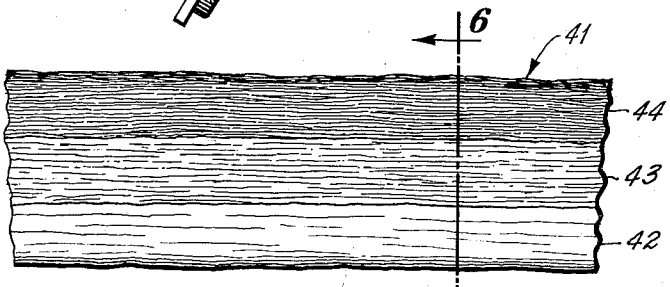
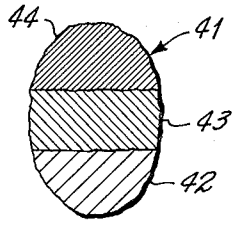


Fig. 5.

Fig. 6.



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United States Patent Office 2,996,873 Patented Aug. 22, 1961

2,996,873

METHOD FOR PRODUCING MULTI-COLORED SINGLE YARN

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Filed Nov. 7, 1958, Ser. No. 772,459
1 Claim. (Cl. 57—156)

The present invention relates to a method and apparatus for producing multi-colored single yarn in simulation of ply yarn having ends of different colors.

The practice of the invention involves the production of a plurality of slivers of different colored fibers, the drawing of those slivers in a common drafting zone while maintaining substantial color separation laterally of the web in the drafting zone, independently condensing the portions of the web formed of the different colored fibers to form what may be termed pseudo-slivers of different colors, the condensing of all of the pseudo-slivers into a single sliver in which the fibers of different colors are substantially concentrated together, and the spinning of a yarn directly from the multi-colored sliver on a spinning frame or a roving frame. The resulting product may be referred to as a simulated ply yarn, a multi-colored single yarn, or a "mock twist" yarn.

It has long been known to twist two or more single yarns to form a ply yarn. This procedure involves the separate production of the completed single yarns followed by the twisting operation. It has also been known to produce simulated ply yarns or "mock twist" yarns by independently carding, first drawing, second drawing, and subjecting to a roving process fibers of different colors to thereby produce rovings of a plurality of different colors. The different colored rovings are then spun in a multiple creeled spinning operation. This latter procedure involves the step of forming rovings of the different colored fibers.

The primary object of the present invention is to produce multi-colored single yarn by a simplified procedure and a sequence of operations which involve a lesser number of steps than has heretofore been considered necessary.

Another object of the invention is to reduce the cost of production of multi-colored single yarns and to obtain a product which is highly satisfactory for many uses, such as pile yarns for carpets and rugs.

The foregoing and other objects and advantages of the invention will be better understood from the following description having reference to the annexed drawings wherein:

FIGURE 1 is a view partially in vertical cross section and partially in side elevation of portions of a drawing frame modified to carry out the present invention;

FIGURE 2 is a top plan view of the portions of the drawing frame illustrated in FIGURE 1;

FIGURE 3 is a top plan view of a modified form of knock-off arm and trumpet assembly which may be used in the apparatus illustrated in FIGURES 1 and 2;

FIGURE 4 is a flow chart of the various steps involved in carrying out the invention;

FIGURE 5 is an enlarged top plan view of a multi-colored sliver obtained in using the knock-off arm and trumpet assembly of FIGURE 3 with the apparatus shown in FIGURES 1 and 2; and

FIGURE 6 is a sectional view taken in the direction of the arrows along the line 6—6 of FIGURE 5.

Fibers of a plurality of different colors are independently subjected to opening, picking, and carding operations to provide different colored card slivers. The card slivers of each color are then independently subjected to a first drawing operation to form different colored drawing slivers.

The apparatus illustrated in FIGURES 1 and 2 is designed to produce a two-colored drawing sliver in the second drawing process. The drawing slivers of different colors produced in the first drawing process are placed in conventional cans 7. Slivers of one color, such as the three slivers designated by the reference numerals 8, 9 and 10, are drawn from the cans 7 between laterally spaced fingers F and over spoons 11 which are conventional parts of well-known stop motions for drawing frames. Slivers of a different color, such as the slivers 12, 13 and 14, are similarly drawn from cans 7 between laterally spaced fingers F and over spoons 11. Lateral separation of the slivers of different colors will be maintained as those slivers enter a common drafting zone consisting of the usual rollers 15, 16, 17, 18, 19, 20, 21 and 22. The fibers of the slivers 8, 9, 10, 12, 13 and 14 are subjected to second drawing in this common drafting zone without any substantial intermingling of the fibers of different colors. The fibers of one color which had constituted the slivers 8, 9 and 10 emerge from the front drawing rolls 15 and 16 as a web 23. The fibers of a different color which had constituted the slivers 12, 13 and 14 emerge from the front rolls as a web 24.

A knock-off arm 25 which forms a portion of a conventional stop motion for the drawing frame supports a trumpet 26 near the nip of calender rolls 27 and 28. The knock-off arm 25, the trumpet 26, and the calender rolls 27 and 28 are conventional. However, the knock-off arm 25 also carries laterally spaced trumpets 29 and 30 which are supported on a common bracket 31 secured to the upper surface of the knock-off arm. The web 23 of fibers of one color pass through the trumpet 29 and are condensed to form a pseudo-sliver 32. The web 24 of the other color passes through the trumpet 30 and is condensed to form a pseudo-sliver 33. The pseudo-slivers 32 and 33 then pass together through the trumpet 26 and are there condensed to form the two-colored sliver 34. The sliver 34 is fed from the calender rolls 27 and 28 to sliver cans. It will be found that the fibers of different colors in the sliver 34 are concentrated together with little intermingling of fibers of different colors.

The sliver 34 is then fed directly to a spinning frame or to a roving frame which has been adapted to impart twist greater than roving twist. A yarn is thereby produced which is in fact a single yarn but in which the fibers of different colors are concentrated together to simulate a ply yarn. It will be noted that in the practice of this invention no roving is ever formed. The single yarn is spun directly from the two-colored sliver. The elimination of the roving step permits economy to be effected in the production of the yarn.

The flow chart of FIGURE 4 conveniently designates the sequence of operations involved in the invention.

The invention is also applicable to the production of single yarns of three colors. In the production of single yarns of three colors, the knock-off arm and trumpet assembly illustrated in FIGURE 3 is utilized. The knock-off arm 35 is provided with laterally spaced trumpets 36, 37 and 38 which are supported by a common bracket 39 secured to the upper surface of the knock-off arm 35. The knock-off arm 35 also carries the centrally positioned trumpet 40 which corresponds to the trumpet 26 of FIGURES 1 and 2. Two or more drawing slivers of a first color are fed from cans 7 directly through the common drafting zone described above and through the trumpet 36 to form a pseudo-sliver. Two or more drawing slivers of a second color are similarly fed through the drafting zone and through the trumpet 37 to form a second pseudo-sliver. Two or more drawing slivers of a third color are fed through the drafting zone and through

the trumpet **38** to form a third pseudo-sliver. These three pseudo-slivers are then fed together through the centrally positioned trumpet **40** where they are condensed to form a sliver of three different colors in which there is little intermingling of the fibers of different colors. The paths of the different colored webs and pseudo-slivers are indicated by arrows in FIGURE 3.

The sliver **41** which issues from the trumpet **40** and the calender rolls **27** and **28** is shown to an enlarged scale and is designated by the reference numeral **41** in FIGURES 5 and 6. The sliver **41** consists of a concentration of fibers of the first color at **42**, a concentration of fibers of the second color at **43**, and a concentration of fibers of the third color at **44**. The sliver **41** is spun directly into yarn on a spinning frame or on a roving frame adapted to impart twist in excess of rowing twist.

In either form of the invention, it is essential that care be exercised to make certain that all of the drawing slivers of one color enter thed rafting zone in side-by-side relationship. In other words, the advantages of the invention would not be realized if drawing slivers of one color were alternated with drawing slivers of a different color as they entered the common drafting zone. It is also important to the obtaining of a yarn of uniform quality to make certain that the relative positions of the different colored slivers are not interchanged as they pass through the drafting zone. If this precaution is not taken, it will be found that the yarn will vary in color or appearance along its length.

I have illustrated and described what I now consider

to be the preferred embodiments of the invention. It will be understood, however, that the specifically illustrated embodiments are exemplary only and that the broader scope of the invention is defined by the following claim.

Having thus described my invention, I claim:

A method for producing multi-colored single yarn directly from drawing sliver without the formation of roving, which method comprises forming a plurality of card slivers of different colors, separately subjecting said slivers of different colors to a first drawing to form drawing slivers therefrom, concurrently subjecting said different colored drawing slivers to a second drawing in a common drafting zone while maintaining color separation of the fibers laterally of the direction of drafting, independently condensing the fibers of different colors after said second drawing to form pseudo-slivers of different colors, condensing said pseudo-slivers together without twist to form a single untwisted sliver in which the fibers of each color are concentrated together, and spinning a yarn directly from said single untwisted sliver.

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