

March 26, 1929.

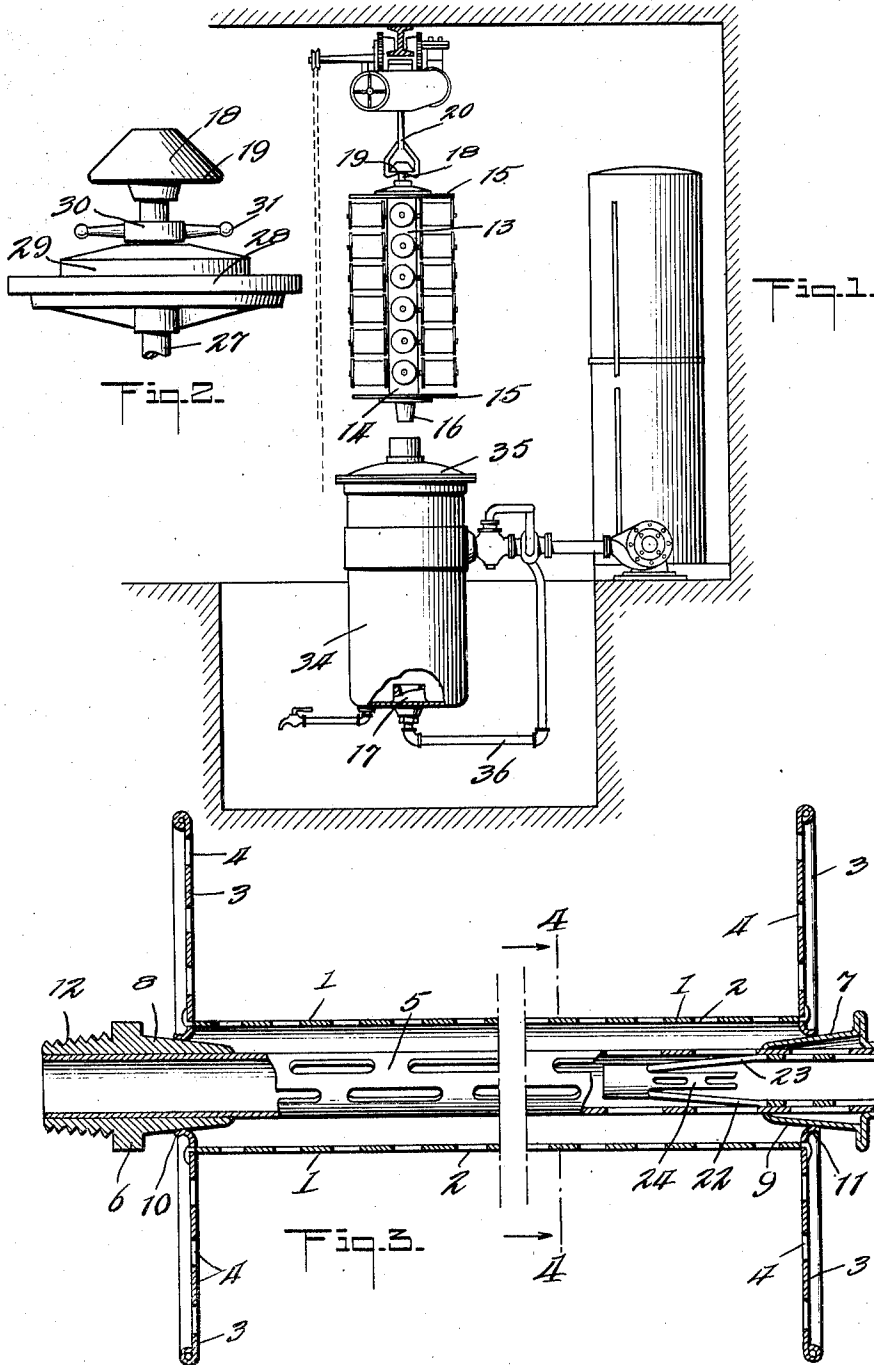
G. W. STEIGER

1,706,826

YARN SPOOL

Filed Jan. 5, 1927

2 Sheets-Sheet 1



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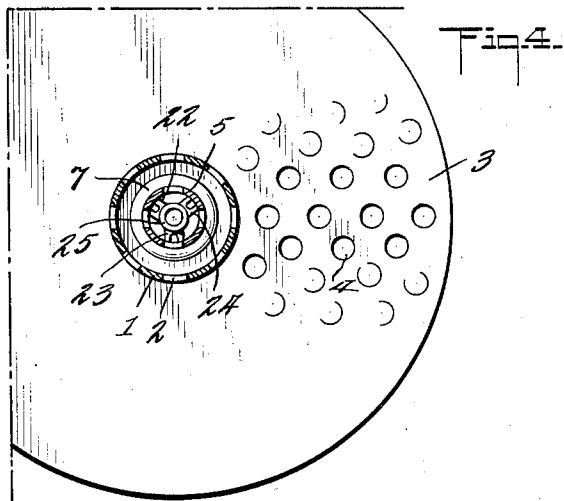
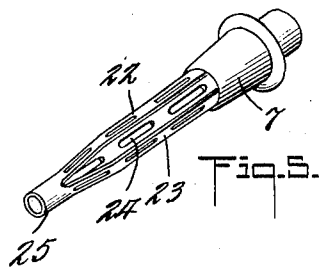
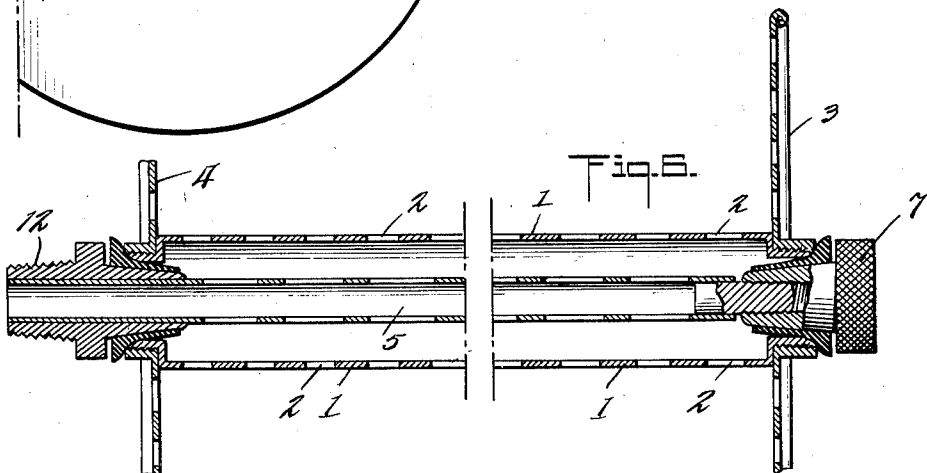
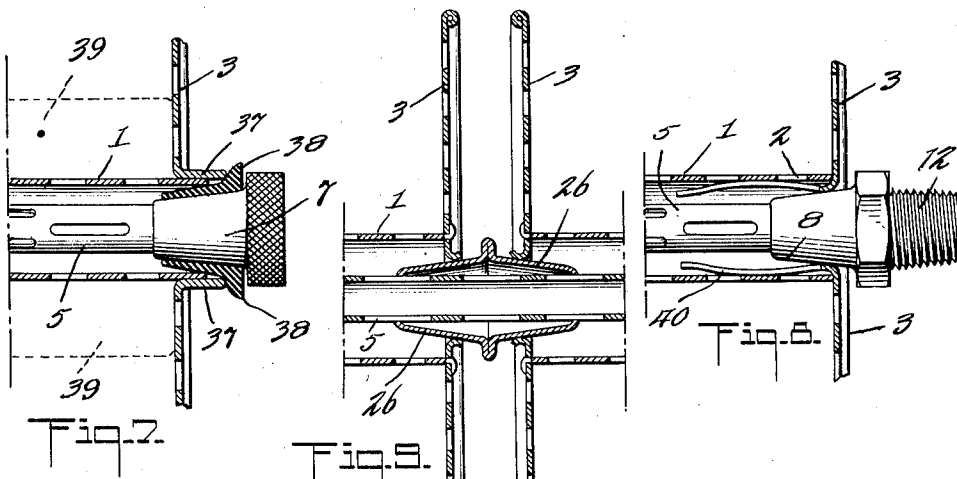
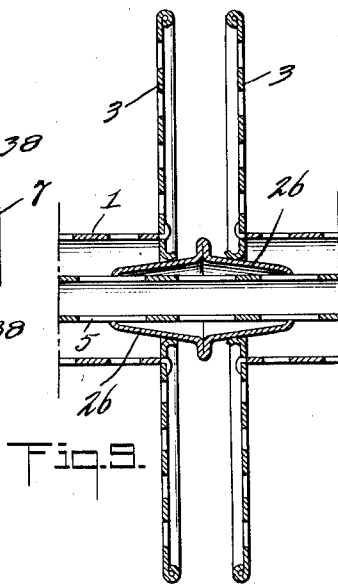
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YARN SPOOL

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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YARN SPOOL.

Application filed January 5, 1927. Serial No. 159,090.

This invention relates to improvements in and relating to the art of dyeing, bleaching and similar operations carried out in the manufacture of textile or other fabrics, together with improvements in apparatus therefor. It has particular reference to the provision of ways and means for facilitating and improving the dyeing or bleaching of textile yarns of all kinds including single and multiple ply artificial silk yarns, mercerized cotton yarns as well as worsted and jute yarns and the like.

In dyeing or bleaching artificial silk yarn in the package form the artificial silk has a tendency to stretch to a considerable extent resulting in an uneven dyeing or bleaching operation or with an entangled fabric on the spools or bobbins entailing trouble and difficulty in subsequent operations. It is one object of the present invention to provide means whereby the even dyeing or bleaching of such yarns is assured and it is a further object of the invention to prevent the undue stretching of the yarns in the package during such operations of dyeing and bleaching.

Moreover, the invention seeks to accomplish the foregoing objects on a large scale so that a plurality of packages of yarn may be dyed or bleached at one and the same time. Other objects of the invention are to effect the efficient washing of the yarn after dyeing or bleaching and to provide for the facile conveyance of the yarn into and from the dyeing or bleaching or other baths. Other objects of this invention will be obvious from the following description wherein certain preferred embodiments are shown and described.

In the methods employed hitherto for the dyeing or bleaching of textile yarns, it has been customary to use a cylindrical, hollow spool carrier on which are mounted a large number of detachable spools carrying the yarn wound therearound, the spools being perforated so that when the dye or bleach liquor is forced into the spool carrier and out along the hollow shafts of the spools, the same will percolate through the openings to contact with and act upon the yarn wound upon the spools. It is for the improvement of such dyeing or bleaching apparatus that this invention has been devised and while the invention relates to improvements in such apparatus in general, the various parts forming the improvements will be described separately in order that the same may be fully understood.

The improvements forming the features of this invention comprise in the first instance an improved dyeing or bleaching spool or bobbin upon which the yarn to be treated is wound together with suitable means for holding or securing the same in the dye or bleach bath. The improved spool or bobbin is formed of a hollow shaft of any suitable substance such as metal, papier-mâché, fibre, or the like, and is provided with end or head pieces adapted to prevent the travel or stretching of the yarns along the shaft of the spool or bobbin, the shaft of the spool being perforated in any suitable manner in order that the dye or bleach liquor may be passed therethrough so as to dye or bleach the yarn as will be hereinafter described. Preferably the end or head pieces of the spool or bobbin are also perforated to enable the liquor to pass therethrough and to effect a more complete dyeing or bleaching of the yarn as will also be more fully described hereafter. The end or head pieces of the spool or bobbin may be formed integrally with or detachably secured to the shaft of the spool and while it is understood that any suitable shape may be given to the head pieces it is preferable for the same to be of circular formation.

The improved spool or bobbin is mounted detachably or otherwise upon a hollow spindle adapted to secure the same in position in the dye or bleach bath, said spindle being perforated appropriately and provided with end pieces the one being formed so as to secure the spool in position and the other adapted to act as a closing means to prevent the liquor from passing directly through the spindle and at the same time forming a closing means for the open end of the spool or bobbin. The end of the spindle adapted to secure the spool in position likewise acts as a closing means for the other end of the spool or bobbin, and either or both ends of the spindle may be detachably or otherwise secured to or formed thereon. Preferably the two end pieces are tapered so as to fit securely into the hollow shaft of the spool or bobbin, means being provided for adjusting the position of the spool or bobbin along the spindle in order that the spool may be

substantially water-proof in the longitudinal direction. The spindle is preferably provided with a screw-threaded end piece although any other securing means or locking device may be employed whereby the improved spool or bobbin is mounted in the dyeing or bleaching machine. The length of the spool may vary according to requirements and when desired means may be provided whereby a plurality of spools may be mounted upon one spindle, said means comprising spacing devices adapted to act as closing means for the ends of the adjacent spools. Preferably these spacing devices are detachably mounted upon the spindle so that the same spindle may be employed for carrying long spools or alternatively a plurality of shorter spools. Advantageously the spacing device consists of two truncated hollow cone-shaped pieces secured at their bases and adapted to slide longitudinally along the spindle. If desired, however, the spindle may be screw-threaded or otherwise formed in order to permit the adjustment of the spacing device or devices therealong, which in such circumstances will naturally be designed to co-act therewith.

The improved spool and spindle is mounted in accordance with this invention upon an improved spool carrier adapted to carry any desired number of spools and comprising a hollow cylinder provided with screw-threaded openings or other openings adapted to receive the ends of the spindles provided with screw-threaded or otherwise formed portions for securing the spools in position. The spool carrier is preferably provided with circular covers projecting sufficiently to form covers for the spools mounted around the cylinder and the spool carrier is provided with means for holding the same in position in the dye or bleaching bath, said means advantageously comprising a male conical joint secured upon the lower cover of the spool carrier and adapted to co-act with a female joint situated in the dye or bleaching bath or kier. The improved spool carrier is provided with inlet and outlet pipes or conduits through which the dye or bleach liquor is passed to flow into the spindle of the various spools, through the openings provided therein and so to dye or bleach the yarn carried upon the spools. Pressure may be used to effect the flow of the liquor or alternatively vacuum means may be used.

In order, however, that this invention may be more fully understood the same will now be described with reference to the accompanying drawings in which one preferred embodiment of the invention is shown and wherein like reference numerals refer to similar or like parts of the apparatus, and in which:

Figure 1 shows a part sectional view of a

dyeing or bleaching apparatus constructed and combined in accordance with this invention.

Figure 2 shows a modified form of the top or head member of the spool carrier.

Figure 3 shows a part sectional side view of an improved spool and spindle.

Figure 4 shows a part view on line 4—4 of Fig. 3.

Figure 5 is a perspective view of a closing means for the end of a spindle.

Figure 6 shows an alternative form of the improved spool and spindle in section.

Figures 7 and 8 show alternative end or head pieces in section mounted upon the end of a spindle.

Figure 9 shows a spacing device co-acting with two end or head pieces of two adjacent spools mounted on one spindle.

Referring more particularly to the drawings, 1 indicates the shaft of an improved spool provided with perforations 2 and furnished at each end with head or end pieces 3, said head or end pieces 3 being provided with perforations 4. The spool is detachably mounted or carried upon an improved spindle formed of a perforated hollow shaft 5 carrying end pieces 6 and 7 tapered as at 8 and 9 to co-act with and close the ends 10 and 11 of the shaft 1 of the spool. The spindle is provided at one end with screw-threaded adjustment 12 adapted to secure the spindle in position in the improved spool carrier 13. The improved spool carrier 13 comprises a cylinder 14 provided at each end with cover plates 15, and at its lower end with a male conical joint 16 adapted to co-act with a corresponding female joint 17 situated in the dyeing kier or bath. The upper end of the improved spool carrier is provided with an abutment 18 carrying projections 19 adapted to co-act with a suitable grab or lifting device 20 whereby the spool carrier may be removed from, or placed into, a dye bath or the like.

The improved spindle may be provided with a detachable end 7 which is secured to the shaft of the spindle by providing the latter with a screw-threaded portion 21 (Fig. 6) coacting with a corresponding screw-threaded interior of the end piece 7 or alternatively the end piece 7 is provided with a projection adapted to slidably engage in the interior of the shaft of the spindle and to co-act therewith in a resilient manner so as to form a secure joining of the end piece 7 therein. The spring projection may be formed as at 22 of a plurality of metal strips 23 preferably perforated as at 24, said strips being bent or formed to provide a tapering cylindrical, or substantially cylindrical, end piece 25 whereby the resilient device is guided into position within the hollow shaft of the spindle. This resilient attachment or device may advance

tageously be made by stamping from one piece of metal, and it is secured within the hollow interior of the end piece 7 in any suitable manner.

5 The modifications shown in Figures 7 and 8 disclose alternative methods of removably attaching the end or head pieces of the spool in position. In Figure 7 the spindle 5 carries the spool 1 provided with end pieces 3, said end pieces being formed with a flange 37 which is held in position by means of a projecting and preferably resilient stopper device 38 situated around the cone-shaped member 7. From the drawing it will be 10 observed that the end piece 3 is prevented from sliding along the spool by reason of the yarn wound therearound and shown diagrammatically at 39.

In Figure 8 an alternative means for securing the removable end piece 3 is disclosed, said means being formed and operating in a similar manner to the closing means for the spindle as indicated in Figures 3 and 5. In Figure 8 a projecting spring device 40 is shown co-acting with the interior of the spool 1. Other alternative methods of disposing these end pieces in position will readily suggest themselves to anyone skilled in the art and the present 25 examples are not to be construed as limiting the invention in any way.

It will be obvious that when removable end or head pieces are employed, the same may be used for succeeding spools of yarn, thus enabling spools of known character to be used in accordance with the invention.

Normally the spindles employed are such as to carry one spool of the usual standard length, but as indicated above, a plurality of shorter spools may be mounted upon one spindle formed in accordance with this invention. In order to securely attach a plurality of smaller spools formed in accordance with this invention, spacing means are provided whereby the ends of the shorter spools are substantially securely closed, and it is desirable for these spacing devices to be removably mounted upon the shaft of the spindle. One such spacing device is indicated in Figure 9, and it is formed of two truncated hollow cone-shaped pieces 26 secured at their bases, said truncated cones being adapted to co-act with and substantially close the ends of the hollow shaft of the spool. It will thus be obvious that one or more spools may be mounted upon a spindle formed in accordance with this invention without any disadvantage to the dyeing or bleaching operation.

60 The male conical joint is attached to the spool carrier by means of an iron spindle or rod 27, said spindle or rod being held in position in the opening of the spool carrier by an internally reinforced disc 28 with the aid of 2 counter nuts 29. Preferably the upper

end of the spool carrier is provided with a lock nut 30, carrying arms 31, whereby the spool carrier may be rotated within the dyeing or bleaching bath at will. Co-acting with the lock nut 30 is an abutment 18, 70 carrying extensions 19 adapted to form engagements with any suitable lifting device 20 in order that the spool carrier may be raised from, or placed into, a dyeing or other bath when desired. 75

By releasing the lock nut 30 an air passage is provided from the center of the spool carrier 13 through which the compressed air or vacuum present in the spool carrier 13 is released when desired. 80

In operation the yarn is wound upon the improved spindles, preferably in parallel manner in contradistinction to the usual diagonal winding, the spools then mounted upon the spindles which are then secured in position upon the spool carrier. The spool carrier carrying the spools of yarn is lowered into the dyeing or bleaching kier 34, the male conical joint 16 co-acting with the female joint 17, the cover of the kier 35 being placed in position, and the dye or bleaching liquor being then injected into the interior of the cylinder 13 through pipes or conduits 36 whereby the dye or bleaching liquor passes upwardly through the cylinder 13 and outwardly into the shafts of the spindles carrying spools of yarn. The perforated shafts of the spindles permit the dye or bleach liquor to pass therethrough and through the shaft of the spool itself to contact with and act upon the yarn wound therearound. By this means the dye or bleaching liquor is brought into intimate contact with the yarn and the end or head pieces secured upon the spools prevent the stretching or travel of the yarn so that an even dye or bleaching is effected. When, and if, desired, the flow of the dye or bleach liquor is reversed by any suitable means so that the liquid circulating exteriorly of the spools of yarn is drawn through the perforations provided in the end or head pieces of each spool, and thus contacts again with the outer surfaces of the yarn wound upon the spools. After the completion of the dyeing or bleaching operation the spool carrier is removed from the dyeing or bleaching bath by means of the lifting device 20, and then conveyed in any appropriate manner to a rinsing bath or the like, into which the spool carrier carrying the spools is lowered. The arm extension pieces 31 then permit the entire spool to be rotated at will in the rinsing bath, thus securing a complete and efficient washing of the yarn. 125

It will be understood that numerous alterations and modifications of the apparatus may be made by one skilled in the art without departing from the spirit and scope of this invention, for instance the end pieces 7 130

of the spindle 5 may, if desired, be so provided with a removable cap at the end, in order that the same spindle may be used when the cheeses are mounted upon a suitable vacuum or blowing machine so that air may pass through the open ends of said spindles.

I claim:

1. A spool for textile yarns comprising a 10 perforated spindle, a cylindrical perforated spool detachably mounted thereon, an end disc secured to each end of said spool, and closing means adapted to close simultaneously one end of said spindle and the corresponding 15 end of said spool, said closing means cooperating with one of said discs to

hold said disc, spindle and spool in coaxial alignment.

2. A spool for textile yarns as claimed in claim 1, wherein said end discs are perforated and detachably secured to said spool. 20

3. A spool for textile yarns comprising a perforated spindle, a cylindrical perforated spool detachably mounted thereon, an end disc on each end of the spool, and means 25 for closing simultaneously one end of said spindle and the corresponding end of said spool, said closing means cooperating with said discs to secure the discs on said spool.

In testimony whereof I affix my signature.

GEORGE W. STEIGER.