

June 14, 1938.

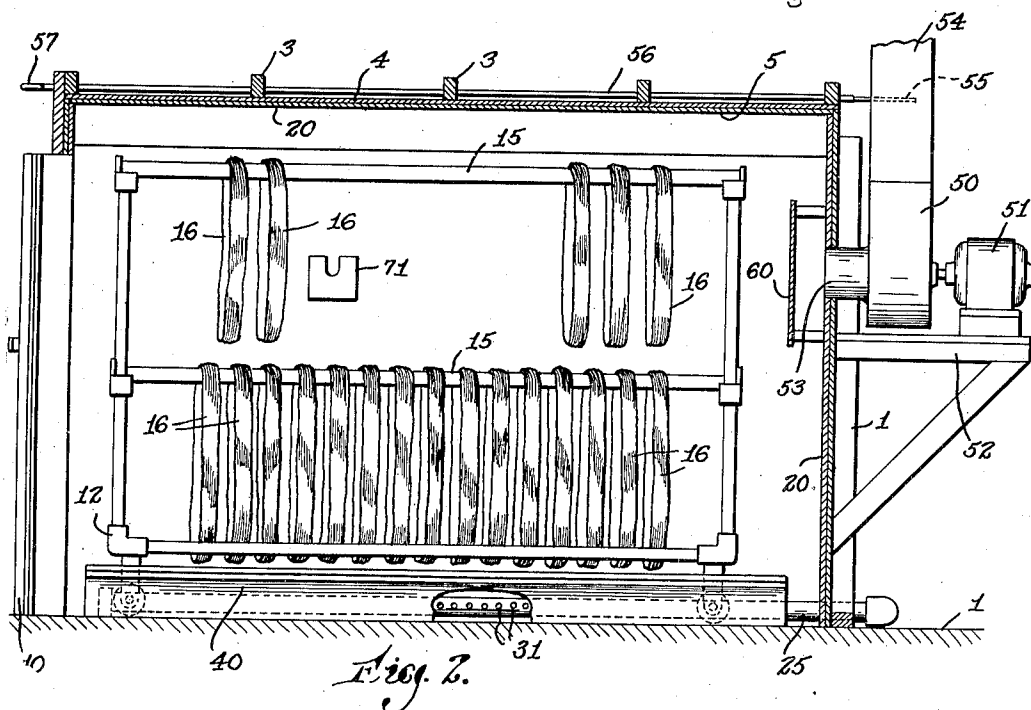
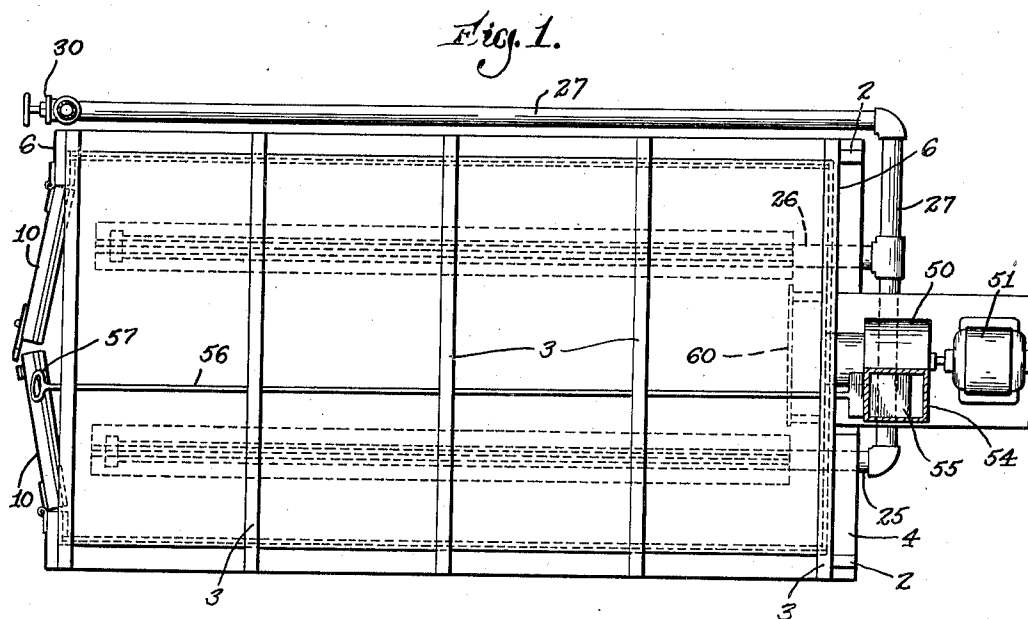
H. C. WOLFENDEN

2,120,844

PROCESS OF CONDITIONING, LOFTING, AND FLUFFING YARNS AND THE LIKE

Filed May 14, 1935

2 Sheets-Sheet 1



Inventor  
Harry C. Wolfenden  
by James R. Hodder  
Attorney

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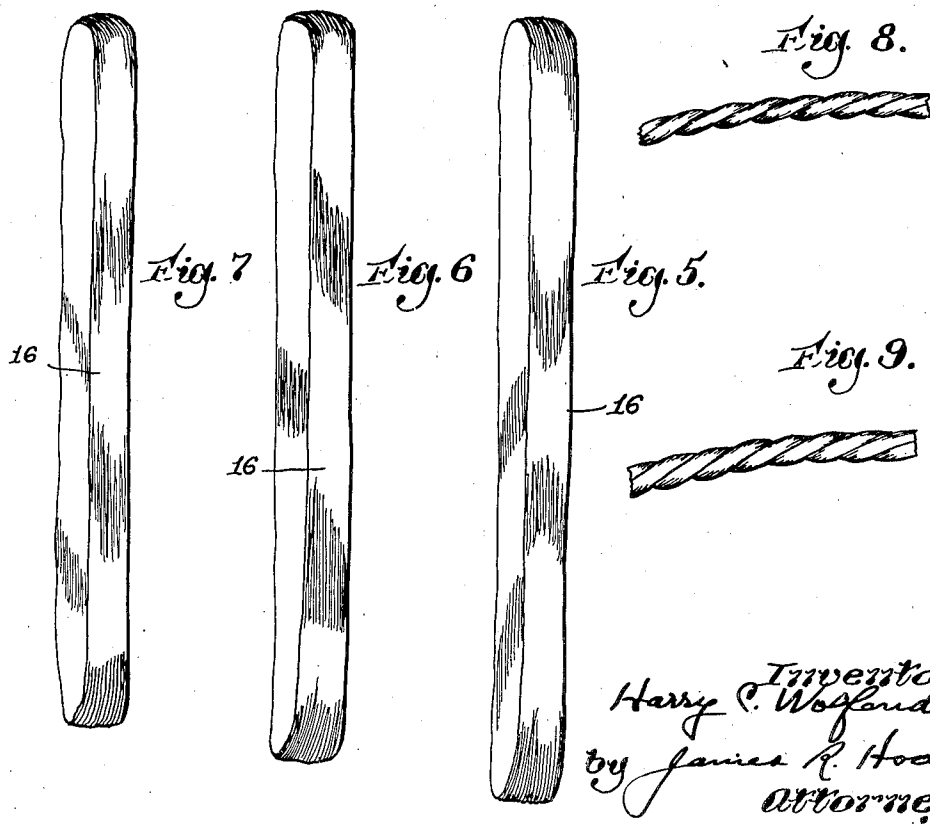
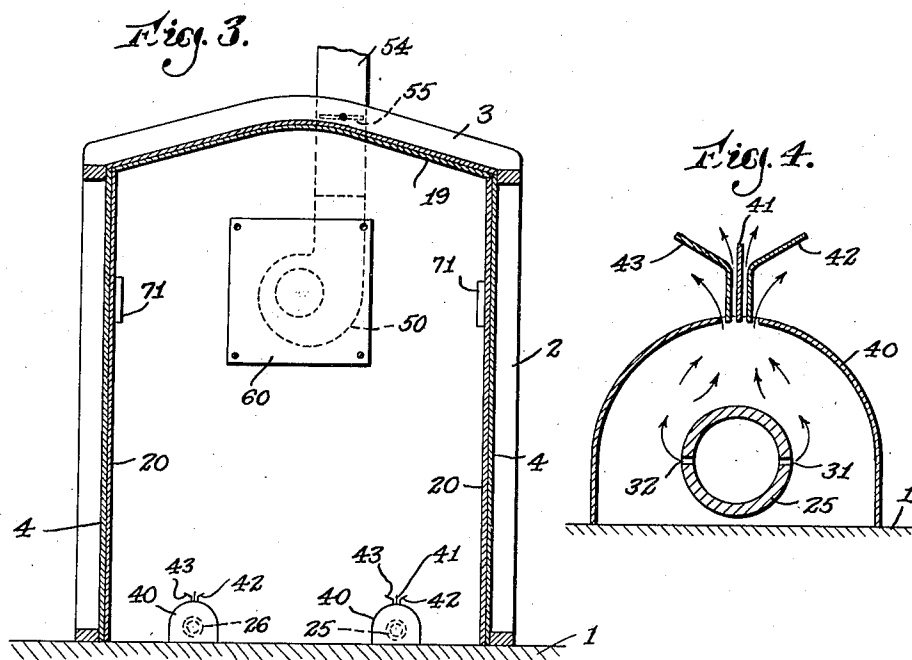
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Harry C. Wolfenden  
by James R. Hodder  
Attorney

## UNITED STATES PATENT OFFICE

2,120,844

PROCESS OF CONDITIONING, LOFTING, AND  
FLUFFING YARNS AND THE LIKE

Harry C. Wolfenden, Attleboro, Mass.

Application May 14, 1935, Serial No. 21,392

1 Claim. (Cl. 8—15)

My present invention is a novel and improved method or process, which consists of a special treatment for conditioning weaving and knitting yarns particularly of worsted, woolen, as well as of rayon, cotton, or other fibers or combinations thereof after the yarn has been through the dyeing processes, and which results in producing a better finished yarn, rendering the same more "lofty", eliminating relative harshness, and imparting the most desirable features of lofting and fluffing the yarn as a finishing action.

Heretofore it has been customary in dyeing and drying yarns to subject the yarn, which is received in its natural condition at the establishment, to various treatments including cleaning, scouring, or washing, and thereafter rinsing in clear lukewarm water, prior to the dyeing operation. The yarn is then dyed by passing the same thru the proper dyeing solution at the proper temperature, whereupon the yarn is then transferred to extractors to remove the moisture, usually by centrifugal action; and thereupon the yarn is taken to rotary dryers for further drying.

During all these treatments of the yarn and transferring of same from one machine operation to the other the yarn is subjected to handling, stretching, and more or less slight straining so that the strand or thread is considerably reduced in diameter, leaving it stringy or in a stretched condition.

My present invention aims to obviate the above difficulties and to provide a final and further conditioning step or process which will result in rendering the finished yarn uniform throughout in texture, moisture-content, and dryness, as well as to restore it to the desirable fluffiness or lofting which the dyeing operation has dispelled, thus quickly and automatically counteracting the former distortions of the various machine operations.

Furthermore, my present improved process serves very materially to develop and set the dye, particularly the more delicate shades to which the yarn may have been dyed, simultaneously lofting, fluffing, and conditioning the yarn.

A still further feature is that my process restores to a substantial degree the extent of moisture in the yarn desirable for maintaining the same in proper condition where it may have been dried too much and become harsh.

In carrying out my present process I provide a conditioning receptacle, room, or the like in which the yarn is put for a short time, and subject it to a special further and predetermined amount of treatment by supplying live steam

therein, usually five or twenty minutes being sufficient to condition the yarn and restore it to its fluffy state, completing the desired conditioning action.

Further advantages, improvements, and novel features will be hereinafter more fully pointed out and claimed.

Referring to the drawings illustrating a preferred embodiment of my invention wherein my process and apparatus are shown,

Fig. 1 is a plan view of the apparatus for carrying out my process;

Fig. 2 is a vertical view partly in cross-section illustrating sections of yarn in the conditioning apparatus;

Fig. 3 is a cross-sectional view on a reduced scale;

Fig. 4 is a cross-sectional view on an enlarged scale illustrating the steam pipe and deflecting guard;

Fig. 5 is a view of a yarn skein after it had been scoured, cleaned, and dyed, but before drying;

Fig. 6 illustrates in diagrammatic form the same after being dried, subsequent to dyeing;

Fig. 7 shows the relative length of the same skein when subjected to my conditioning and lofting process;

Fig. 8 is illustrative of the normal diameter of the yarn in a skein after dyeing, and

Fig. 9 illustrates the same after having been subjected to my conditioning process showing it in its improved lofted and fluffed condition.

As shown in the drawings, I provide a suitable receptacle, here illustrated as a steam-tight box or room, suitable to receive a single rack of yarn skeins, although the apparatus may be of sufficient size and width to provide a plurality of such racks. In the drawings 1 designates a floor or support on which side stanchions 2—2 and roof beams 3—3 are formed to hold the walls 4—4, roof or ceiling 5, and ends 6—6 constituting the conditioning receptacle. Suitable doors 10—10 are provided at one end which may be opened to receive a rack 12 carrying a series of bars 15—15 on which the skeins of dyed yarn 16—16 are loosely hung in spaced relation.

I find it important to construct this receptacle with a lining of moisture-repellent material. Otherwise, the steam which is admitted within the conditioning receptacle will condense and leave too much moisture which will drip from the ceiling, and instead of properly conditioning the yarn and rendering it uniform, may result in non-uniformity. For this purpose I line the walls,

ends, and doors with moisture-repellent material, designated at 20—20, which may be sheet rock or the like standard article, or may be a proper sheathing or lining suitably coated to be moisture-repellent.

The ceiling 5 I desire to form or finish with a water-absorbent material, such as Celotex, or the like so that the steam will be absorbed thereby and will not drip upon the yarn on the rack beneath. The floor 1 is preferably of concrete and, therefore, the condensed steam which drips off the sides 20 and off the receptacle will condense, form on the floor 1 as water, and be conducted off by any suitable drain.

Along the floor 1 I provide one or more pipes, here shown as two in number, viz 25 and 26, leading the same through a conduit 27 to any suitable source of steam supply and, preferably, providing a valve 30 adjacent the door end or to the left, viewed in Figs. 1 and 2. These steam pipes are each provided with a series of holes or recesses, preferably on opposite sides, as shown at 31 and 32, Fig. 4, so that steam emerging from the pipes 25 and 26 will flow from the series of holes, as shown, around the pipe and upwardly, treating and conditioning the yarn or the rack 12. I prefer, also, to provide a guard 40—40 protecting the steam pipes, and provided with baffle plates 41, 42, and 43 substantially as shown in Fig. 4 to deflect the steam rising from the steam pipes, dispersing the same, and rendering it more even in its flow upwardly through and around the yarn 16. These baffles are fitted through openings in the top of the guards 40 and provide a series of steam passages therethrough, as shown by the arrows in Fig. 4.

After a rack 12 filled with yarn is rolled into the receptacle, the doors 10 are closed, giving a steam-tight structure; the valve 30 is opened, and steam admitted for the desired length of time. From five to twenty minutes is usually sufficient for the conditioning and treatment of any type of yarn and any kind of dye to effect the developing, setting, lofting, and fluffing, as well as rendering the same uniform throughout, eliminating harshness, and giving a desirable additional weight by moisture to the yarn.

I have illustrated in Figs. 5, 6, and 7 a comparative view showing lengths of a yarn skein, Fig. 5 illustrating same after scouring and dyeing; and Fig. 6 showing the same slightly shrunk, tensioned, stretched, and the fibres narrowed after drying.

When applied to the dyeing tank, a bar is put thru each end of the skein so that a substantial tensioning may result during the dyeing action, resulting in tightening the strands of each, Fig.

8 being a typical illustration. During the normal drying in extractors and rotary air dryers, the moisture is simply removed and no special lofting or fluffing action results; while by my improved process and in my conditioning apparatus the skein will shrink still further, as shown in Fig. 7, and the yarn is fluffed, lofted, and increased in diameter substantially as shown in Fig. 9 in comparison with the narrower diameter of yarn in Fig. 8.

In addition, the drying and developing of the dye renders the entire yarn more uniform while eliminating harshness, thus obtaining an important advantage by my conditioning process.

When the steam valve is shut off the steam may remain in the apparatus for a short time and then the doors 10 opened and the rack 12 rolled out and replaced by another rack. However, in order to control the steam and prevent its escaping through the doors 10, I provide a blower 50 operated by any suitable source of power, such as a motor 51, arranged on a suitable support 52 at the rear of the apparatus, having an entrance 53 into the interior of the receptacle. An opening stack 54 extends from the blower outside the building, and when the steam is supplied a damper 55 operated by a rod 56, extending to a handle 57 near the front or door end of the receptacle, is kept closed. This steam is held within the receptacle when the damper 55 shuts off the stack 54, and, when drawn outwardly or to the left, viewed in Figs. 1 and 2, and the motor 51 turned on the fan will suck or draw the steam out of the receptacle prior to opening the doors 10.

A guard 60 is also preferably supplied so that the rack 12 will not be too close to the blower when it is turned on and will guard against any yarn at the blower end of the receptacle being drawn into the same.

I may supply one or more cross-brackets 71, as shown in Figs. 2 and 3, in which a single bar with a set of skeins of yarn or a single skein may be applied instead of using the racks 12 if it is desired to treat a small quantity or number.

I claim:

The improvement in the art of dyeing yarns, which consists in completing the various dyeing operations on skeins of yarns, thereafter suspending the dyed yarns loosely from a horizontal bar in a conditioning receptacle, and thereupon adding moisture to the dyed yarn by means controlling a predetermined circulation of steam in said receptacle, and thereby increasing the diameter of the dyed yarns to produce a lofting and fluffing of the yarn.

HARRY C. WOLFENDEN.