No. 757,104. PATENTED APR. 12, 1904.

J. W. FRIES.

APPARATUS FOR OXIDIZING AND DRYING TEXTILE MATERIAL.

APPLICATION FILED JAN. 25, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

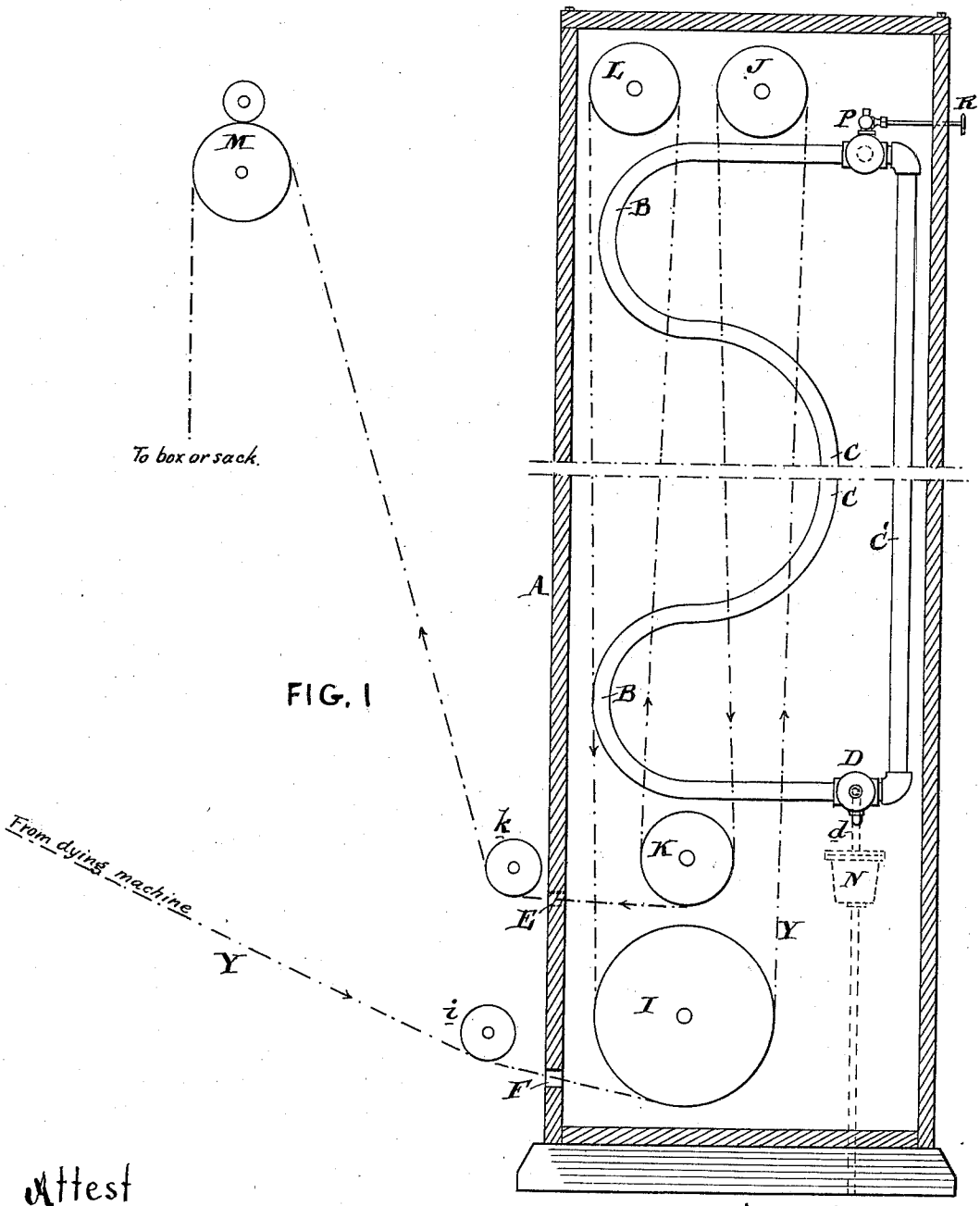


FIG. 1

Attest
R. M. Kelly
R. M. Hunter.

Inventor
John W. Fries
By his Atty
R. M. Hunter

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 2 SHEETS—SHEET 2.

FIG. 3

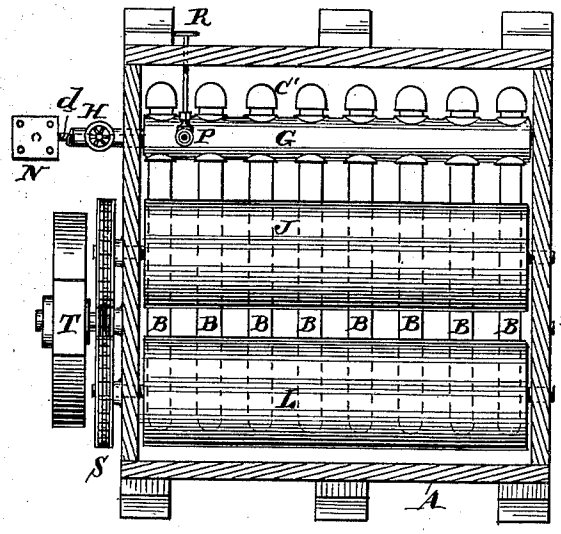
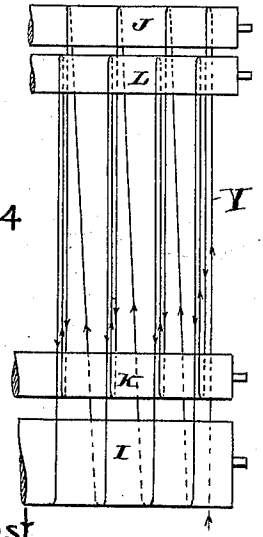


FIG. 4



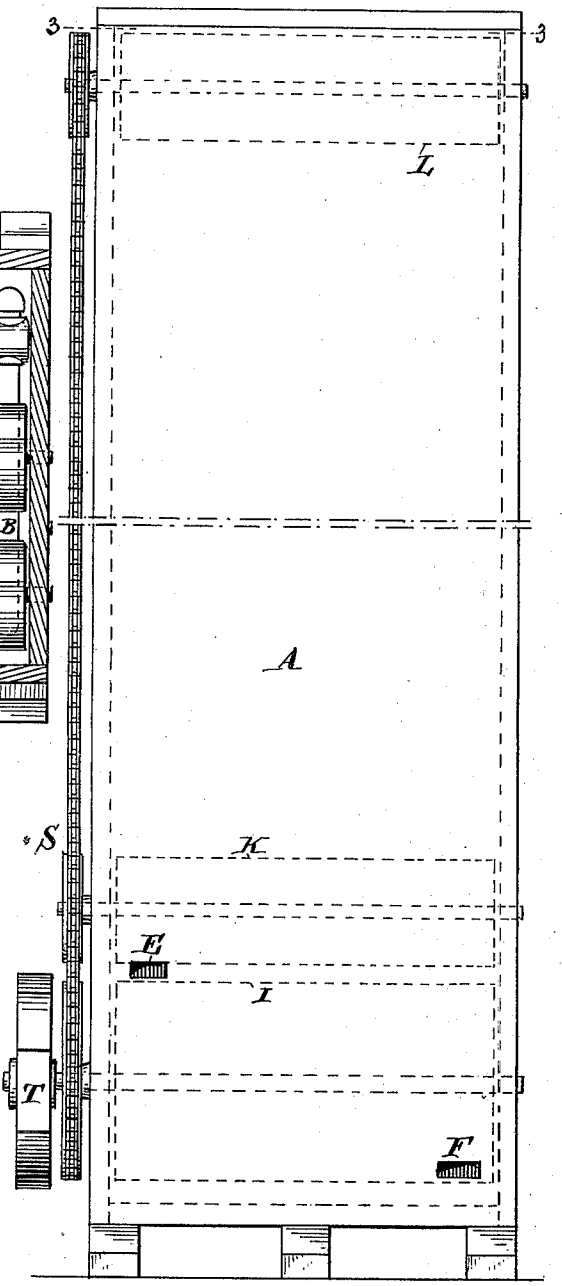


FIG. 2

Attest
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No. 757,104. Patented April 12, 1904.

UNITED STATES PATENT OFFICE.

JOHN W. FRIES, OF WINSTON-SALEM, NORTH CAROLINA.

APPARATUS FOR OXIDIZING AND DRYING TEXTILE MATERIAL.

SPECIFICATION forming part of Letters Patent No. 757,104, dated April 12, 1904.

Application filed January 25, 1901. Serial No. 44,716. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. FRIES, of the city of Winston-Salem, county of Forsyth, and State of North Carolina, have invented an Improvement in Apparatus for Oxidizing and Drying Textile Materials, of which the following is a specification.

My invention has reference to drying apparatus for textile material; and it consists of certain improvements, all of which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

My invention has for its object the construction of a drying apparatus which shall simultaneously subject the material previously dyed to a steaming process and action of high-temperature radiant heat, the same performing the function of fixing and brightening the colors in the manner set out in my application for process of drying bearing even date with this.

In carrying out my invention I provide a suitable closed chamber provided with steam coils, pipes, or cells, into which steam at high pressure is passed to secure a high degree of radiant heat. The chamber is provided with transverse guide-rollers at top and bottom, about which the yarn or textile material is guided, so as to move up and down many times within the chamber before it emerges, and thereby be retained within the chamber in position to be acted upon by the radiant heat of the steam-coils until it becomes substantially dry, the said drying process being carried on in a bath of steam which fills the chamber. The yarn or textile material is fed into the chamber through an aperture near its bottom, and likewise it is withdrawn through an aperture near the bottom, so that no steam can escape from the upper or effective part of the chamber.

The textile material, whether yarn or woven fabric and when properly dyed, is caused to pass through an atmosphere of steam while being subjected to a high temperature of radiant heat, which has the effect of expelling the excess of moisture in the dye solution contained in the material under treatment while drying out the material under high temperature in a bath of steam. The compartment in which this process is carried on is kept supplied with steam provided by vaporizing the moisture carried in with the textile material. Consequently after first filling the chamber or compartment with steam no further supply of steam is necessary, the same being insured by the employment of the high-temperature radiant heat used to properly develop, brighten, and fix the color.

My invention will be better understood by reference to the drawings, in which—

Figure 1 is a sectional side elevation of a drying-machine embodying my improvements. Fig. 2 is a front elevation of same, and Fig. 3 is a sectional plan view of same on line 3 3 of Fig. 2.

A is the closed chamber, being preferably of much greater height than width or depth. Within this chamber I arrange the heating-coils, which consist of manifolds D G, near bottom and top, connected by a series of heating-pipes B, C, and C′, the former being preferably made with the forward projecting bends B B. Steam is supplied to the upper manifold G of the coils by a steam-pipe H, having a suitable regulating-valve. A small valve P, operated by a handle R, extending outside the chamber, permits escape of steam from the coils into the chamber to fill it with steam in the first instance.

The lower manifold D is supplied with a drain or drip pipe *d* for water of condensation, which is conveyed to a suitable steam-trap N.

The yarn Y enters the chamber through aperture F, close to the bottom, and is received by a roller I, under which it passes. This yarn is then guided upward and about a roller J at the top of the chamber, thence downward and around a smaller roller K near the bottom of the chamber, thence upward and over a second roller *k* at the top of the chamber, then downward under and around the lower roller I, and so on, until said rollers are filled. The yarn finally leaves the under

part of roller K and passes out of the chamber A through an aperture E near the bottom. The yarn is then guided about a roller L upward and through delivery-rollers M into a suitable box or sack.

The yarn which enters the drying and steaming chamber is first dyed in any suitable manner, and thereby goes into the chamber in a wet condition. An excellent manner of dyeing said yarn or textile material is to subject it to a dye compound while in the dry condition and force the said compound into the yarn by pressure secured by passing it between rollers, as set out in Letters Patent No. 659,343, of 1900, and No. 620,578, of 1899, granted to me. When the yarns are to be beamed and woven after the dyeing, it is preferable to treat them to starch and an alkali, such as carbonate of soda or caustic soda, as set forth in an application of mine for process of dyeing bearing even date with this.

The yarns are guided into the aperture F of the chamber by the guide-roller *i*, so as to prevent objectionable abrasion against the walls of the opening. By arranging the steam-pipes B comparatively close together spaces are formed between which the traveling yarn passes in being guided about the rollers within the chamber. The travel of the yarn will be readily understood from Fig. 4, in which the rollers J L are shown one above the other instead of in the same plane to avoid confusion in showing the yarn-threads. The steam-pipes B B come between each grouping of the yarn, as will be readily understood, so that it travels from one side to the other of the chamber and finally emerges from the aperture E in a practically dry condition. The yarn may be kept clear of the pipes or may be caused to travel in contact with them, as desired; but the action of the radiant heat alone is amply sufficient to secure the brightening, fixing, and drying of the yarn while in the bath of steam. When I speak of the yarn coming from the chamber in a "dry" condition, it is to be understood that I do not mean absolutely dry, but in such a condition that the moisture left in is only that due to the action of the steam at high temperature, as will be readily understood by those skilled in the art.

If the apparatus is to be used for drying other material in the web, the apertures should be made sufficiently large to permit the free passage of the material.

To make all of the rollers I, K, J, and L travel at the same surface speeds, I may connect their shafts by sprocket chain and wheel transmission S, and the shaft of roller I may be provided with any well-known type of expansion-pulley for varying the speed of travel of the yarn through the chamber to make it commensurate with the travel to the steaming and drying chamber from the dyeing-machine and also to regulate the time the yarn shall remain in the chamber.

In speaking of the parts I J K L as "guide-rollers" it is to be understood that I do not confine myself to smooth solid rollers, as they may be formed in any way found preferable, a well-known form of rollers for guiding textile material being formed with ribs on its surface or formed of a series of slats parallel to the shaft and arranged around it in a circle, such construction being usual in hot-air slashers, and such well-known types may be used in my improved drier.

While I prefer the construction herein shown, I do not limit myself to the details thereof, as they may be modified in various ways without departing from the spirit of my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steaming and drying apparatus, the combination of an upright chamber having apertures for the entrance and egress of the yarn, &c., only at its lower part, vertical steam-pipes extending transversely across the chamber at its middle part and between which the yarn is caused to travel, one or more guide-rollers within the chamber above the pipes, and guide-rollers within the chamber below the pipes and adjacent to the apertures.

2. In a steaming and drying apparatus, the combination of a closed chamber having apertures for the entrance and egress of the yarn, &c., at its lower part, a series of guiding-rollers for the yarn or textile material at upper and lower parts of the chamber and located within the same, and steam-pipes for heating the interior of the chamber having portions projecting between the upper and lower rollers and in the path of the traveling yarn or textile material, means to supply steam to the upper part of the steam-pipes, and a steam-trap connected with the lower part of the steam-pipes to remove the water of condensation.

3. In a steaming and drying apparatus, the combination of an upright chamber having apertures for the entrance and egress of the yarn, &c., only at its lower part, steam-pipes extending transversely across the chamber at its middle part in bends, one or more guide-rollers within the chamber above the pipes, guide-rollers within the chamber below the pipes and adjacent to the apertures, and a valved pipe for admitting steam to the interior of the chamber.

4. In a steaming and drying apparatus, the combination of a closed chamber having apertures for the entrance and egress of the material to be treated arranged at its lower part, guides near the top and bottom within the chamber for the material to be treated, steam-

pipes within the chamber having portions thereof projecting between the upper and lower guides for producing radiant heat while the material being treated is subjected to a bath of steam produced by vaporizing its moisture, and means for admitting steam to the chamber.

In testimony of which invention I have hereunto set my hand.

JOHN W. FRIES.

Witnesses:
A. F. PFOHL,
PAUL E. FOYLE.