June 13, 1944. P. K. SCHWARTZ 2,351,549

METHOD FOR TREATING FILAMENTS AND THREADS

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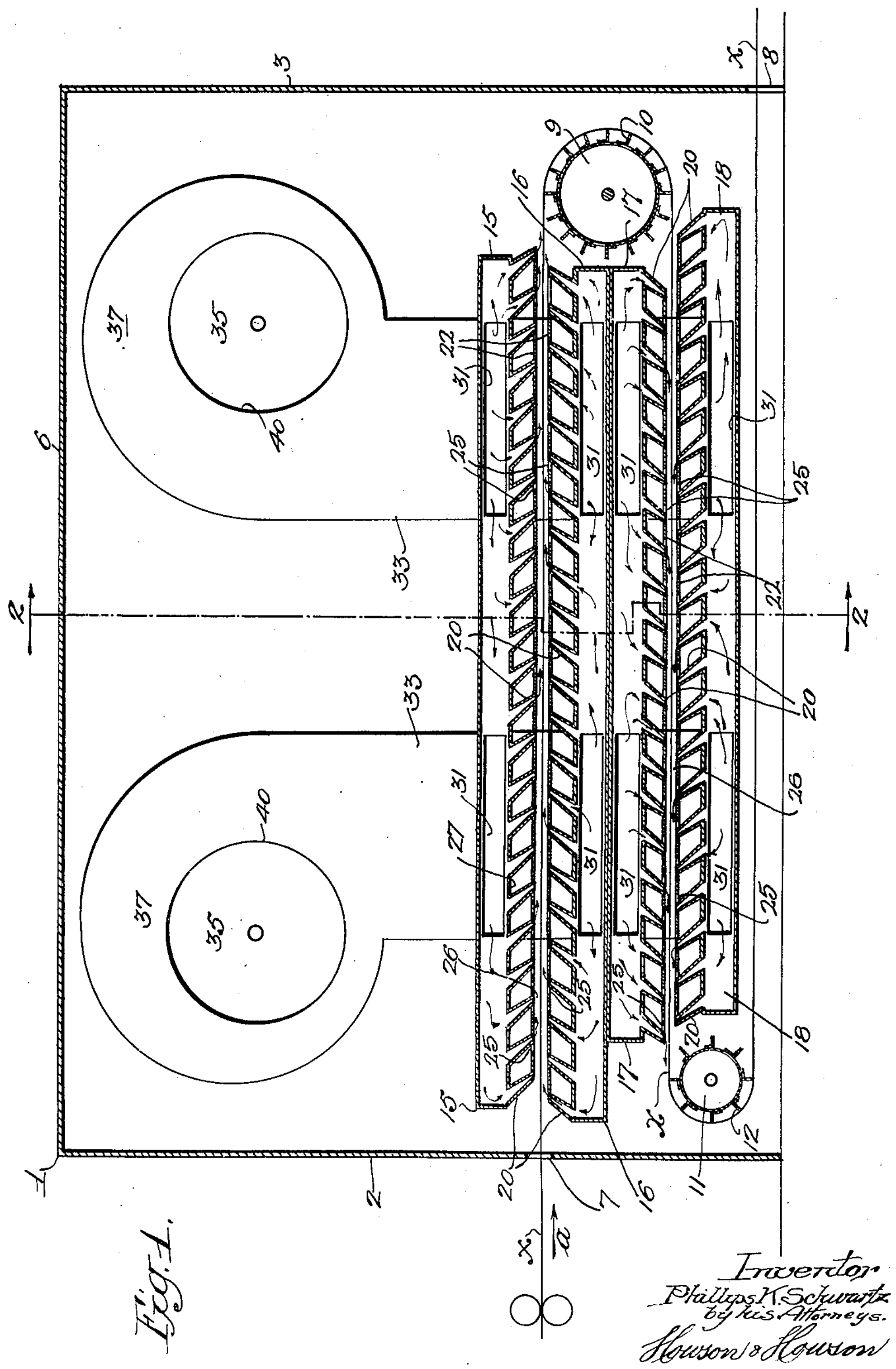

Fig. 1.

Inventor
Phillips K. Schwartz
by his Attorneys.
Howson & Howson

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Fig. 2.

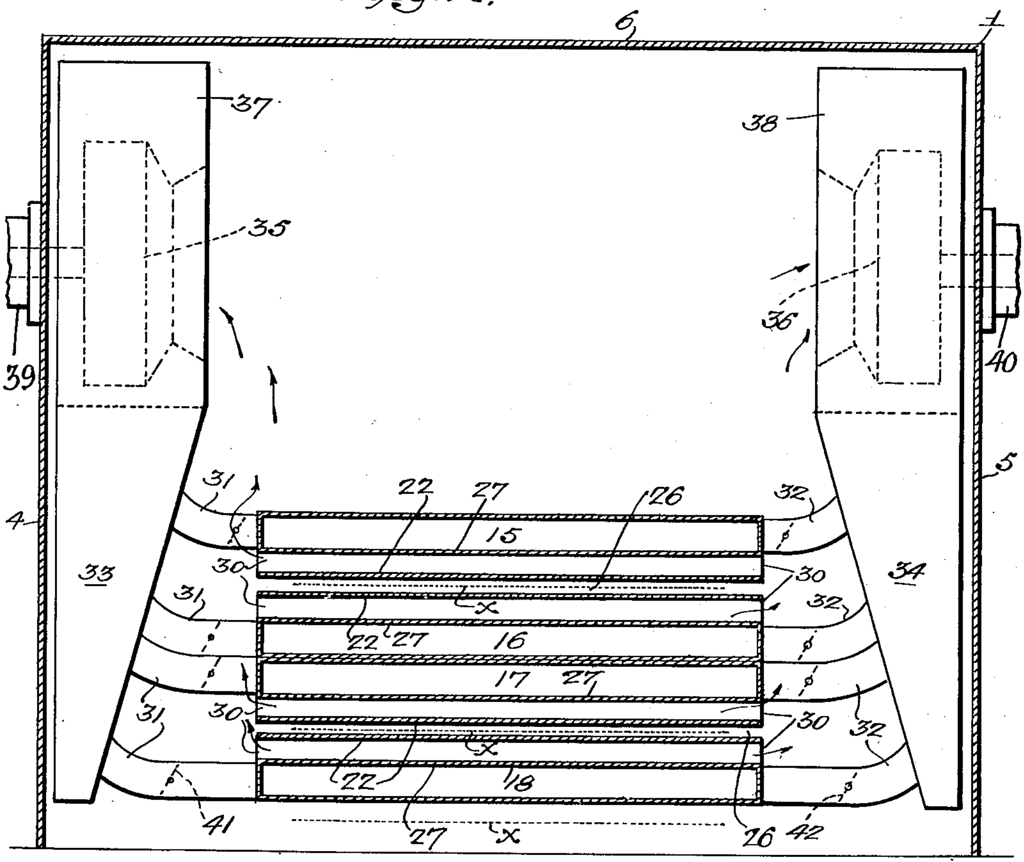
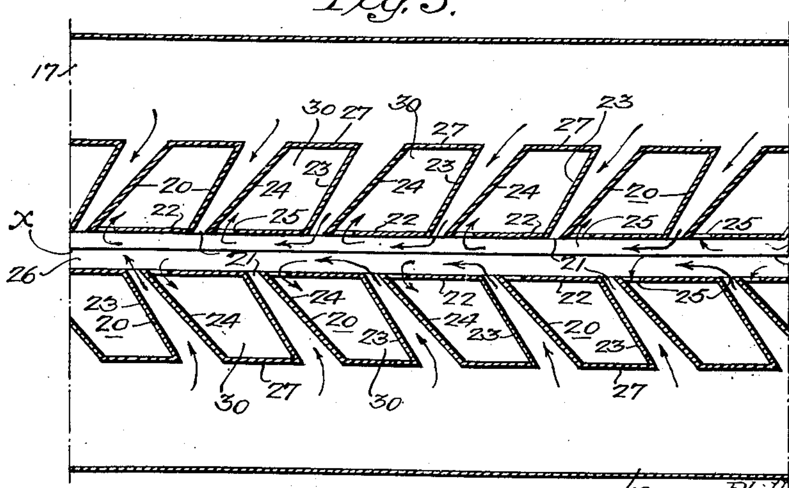


Fig. 3.



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by his Attorneys
Howson & Howson

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METHOD FOR TREATING FILAMENTS AND THREADS

Phillips K. Schwartz, Philadelphia, Pa., assignor to Proctor & Schwartz, Incorporated, Philadelphia, Pa., a corporation of Pennsylvania

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1 Claim. (Cl. 34—23)

This invention relates to a method for drying or otherwise treating, by means of a gaseous medium in circulation, continuous filaments, threads or yarns, such as textile warps, etc.

The drying of warps, for example, is commonly effected by machines known as "Slashers" and the type of slasher most commonly used in the trade at the present time is a dryer embodying one or more heated cylinders about which the threads extend in substantially parallel side by side relation, in a form resembling a sheet. The contact of the threads with the hot metal constituting the peripheral surface of each cylinder, has a detrimental effect on the threads, i. e. the threads frequently become overheated and break. The threads become flat on one side. Furthermore, the threads have a tendency to cling together when adjacent threads make contact with each other.

The method of the present invention is preferably effected by what may be termed an "air-slasher," in that it has certain distinguishing characteristics, hereinafter disclosed, over the ordinary slashers which makes it particularly adaptable for the purpose.

In the air-slasher used for effecting the improved method of the present invention, the overheating, breaking and flattening are eliminated by reason of the threads being suspended and dried free of any contact with hot metal, and the adhesions are effectively prevented by the threads being constantly vibrated in their own respective vertical planes, by the particular kind of air-circulation provided in accordance with the subject matter of the present invention.

The distinctive feature of the present invention resides in the fact that the drying air is at all times directed against the threads, and also removed from the vicinity of the threads, while the air is moving in the direction of the length of the threads, without, at any time, traveling transversely across the threads while in contact therewith or while in the immediate vicinity thereof.

In the accompanying drawings:

Fig. 1 is a longitudinal vertical sectional elevation of an air-slasher operable in accordance with the principles of the present invention;

Fig. 2 is a transverse sectional elevation taken on the line **2—2**, Fig. 1; and

Fig. 3 is a fragmentary enlarged section illustrating the principal characteristics of the present invention.

As shown in the drawings, the slasher comprises a normally closed casing **1**, including end walls **2** and **3**, side walls **4** and **5**, and a roof **6**; with an inlet opening **7** for the threads *x* formed in the end wall **2**, and an outlet opening **8** for said threads formed in the opposite end wall **3**.

Within the casing **1**, adjacent the end wall **3**, there is a drum **9** having a peripheral face formed of circumferentially-spaced, axially-extending ribs or slats **10**. Adjacent the end wall **2**, within the casing **1**, is a second drum **11** provided with axial ribs **12** on the peripheral face thereof.

As shown in Fig. 1, a multiplicity of threads *x*, *x* arranged in side by side substantially parallel relation to each other and resembling a sheet of substantial width, pass through the inlet opening **7** and through the casing **1** in an upper horizontal plane in the direction of the arrow *a*. The threads *x* pass around the drum **9**, which reverses the direction of movement of the threads in the casing in an intermediate horizontal plane, to and around the drum **11**, which again reverses the direction of travel of the threads *x* in a lower horizontal plane, in the present instance.

Above and parallel to the uppermost horizontal run of threads *x* is an air-box **15**, and below said uppermost run is an air-box **16**. Above and below the intermediate run of threads *x* are air-boxes **17** and **18**, respectively.

The air-boxes **15**, **16**, **17** and **18**, as clearly shown in Fig. 1, extend longitudinally of and substantially from one end wall to the other within the casing **1**, and transversely of said casing to an extent greater than the width of the sheet formed by the multiplicity of threads *x*, *x* running between the boxes **15—16** and **17—18**. Projecting downwardly from each of the upper boxes **15** and **17**, and upwardly from the lower boxes **16** and **18**, respectively, is a series of air-nozzles **20**, which are inclined in the direction of movement of the threads between the vertically-spaced pairs of boxes.

Each nozzle **20** is provided with a transversely-elongated outlet slot **21** of a greater length than the width of the sheet of threads *x*, at the extreme outer end of the nozzle. The inner end of each nozzle communicates with the interior of the box **15**, **16**, **17** or **18** from which the respective nozzles extend.

Substantially coincident with the common plane of the outer ends of the series of nozzles **20** associated with each of the boxes **15**, **16**, **17** and **18**, is a series of transversely-extending plates **22**, which form continuations with the lower edge of the rear wall **23** of each nozzle **20**, and terminate forwardly of the forward wall **24** of the next succeeding nozzle **20**, leaving, in the common plane of the plates 22, 22, a series of inlet slots 25 intermediate successive nozzle slots 21, 21, respectively, and immediately adjacent and forward of each outlet slot 21. The inlet slots 25, and the outlet slots 21, extend transversely of the casing 1, continuously, to an extent greater than the width of the sheet of threads x.

The outer ends of the nozzles 20, and the plates 22 intermediate said outer ends, associated with each pair of boxes 15—16, 17—18, form a horizontal channel 26 through which the threads x pass.

The wall 27 of each box 15, 16, 17 or 18, from which the series of nozzles 20 project, the plates 22, spaced vertically from the wall 27, the rear wall 23 of one nozzle, and the front wall 24 of the next succeeding nozzle constitute transversely-extending air-circulating channels 30, 30 with which the slots 25 respectively communicate.

As shown in Fig. 2, the interior of each box 15, 16, 17 and 18 communicates through end ducts 31 and 32, at the opposite sides of said boxes, respectively, with discharge ducts 33 and 34 of air-circulating impellers 35 and 36, which are respectively disposed adjacent the side walls 4 and 5 of the casing 1.

The impellers 35 and 36 may be of any desired type rotatably mounted within housings 37 and 38 and operated by any suitable means disposed preferably outside the casing 1, such, for example, as individual motors 39 and 40.

The impeller casings 37 and 38 are provided with inlet openings 40, which permit air to be drawn into the impeller housings from the interior of the slasher-casing 1, and the transversely-extending ducts 30, 30 are open at their opposite ends, as clearly shown in Fig. 2, to afford communication with the interior of the slasher-casing 1.

As shown in Fig. 1, the outlet slots 21 of the air-boxes 15—16 and 17—18 are in staggered relation to aech other, and are respectively arranged opposite the plates 22 of the air-ducts 30.

With the air-impellers 35 and 36 in operation, air is drawn into the impeller housings 37 and 38, through the inlet openings 40 thereof and discharged through the ducts 33 and 34, respectively, into the ducts 31 and 32, respectively, which deliver the air into the air-boxes 15, 16, 17 and 18, from the opposite sides thereof, under control of suitable dampers 41 and 42, which are respectively disposed in the ducts 31 and 32. The air under pressure built up by the impellers 35 and 36 escapes from the boxes 15, 16, 17 and 18 through the discharge slots 21 of the nozzles 20 and impinges against the sheet of threads x, x passing horizontally through the channels 26, the air from each nozzle being directed against the threads in the direction of the length and of the movement of the threads through the channels 26. The transverse ducts 30, being in communication with the interior of the slasher housing 1, are also in communication with the inlet openings 40 of the air-impellers 35 and 36, consequently, the air in the ducts 30 is at a lower pressure than the air escaping from the nozzles 20, thus, circulation from the channels 26 into the ducts 30 is created.

As a result of the above, the air escaping from each nozzle slot 21 impinges against the threads x and travels with and lengthwise of the threads x, in the direction in which said threads are traveling, and is withdrawn from the vicinity of the threads x, x through the inlet slot 25 adjacent the next succeeding nozzle 20.

Thus, a substantial portion, at least, of the air escaping from each nozzle moves with the threads for a relatively short distance in the channels 26 and is withdrawn from said channels through the slots 25 in the course of circulation set up by the impellers 35 and 36.

Obviously, the velocity of the air circulating in the channels 26 may be equal to, exceed, or be less than, the speed of travel of the threads x through the channels 26, and the volume of air delivered into the channels 26 may be controlled by manipulation of the dampers 41 and 42.

As a result of the staggered relationship of the nozzles 20, 20 in impinging air against the threads x, said threads are vibrated vertically, in relatively high frequency, as they travel horizontally through the channels 26, and the alternate blowing of the air against the top and bottom of the sheet of threads x, at relatively close intervals, maintains the threads in suspension and free of abraiding contact with the discharge ends of the nozzles. This vertical vibration keeps the threads x, x from overlapping and from clinging to each other.

The threads x, x may be drawn through the casing 1 by any suitable means, forming no part of the present invention which will keep the threads relatively taut and in the common plane represented by the sheet produced by the multiplicity of threads disposed side by side and substantially parallel in said plane.

If desired, the direction of travel of the threads x, x through the casing 1 may be reversed, causing the air to move in a direction opposite to that in which the threads are traveling in the channels 26, 26.

I claim:

The method which consists in maintaining a plurality of filaments side by side in a common plane spaced equally from parallel perpendicularly spaced walls of a channel through which said filaments advance, advancing said filaments in one direction longitudinally of said channel, directing incoming continuous sheet-like streams of drying medium through said walls at converging angles to said plane across the full width of the channel at spaced intervals along said channel, with the streams from the opposite walls of the channel commingling into a common current moving through the channel in the direction of advance of the filaments, staggering the incoming streams from the opposite walls longitudinally of the channel, and withdrawing corresponding outgoing sheet-like streams of said medium from said common current parallel to each of the incoming streams immediately in advance thereof, whereby the incoming stream in each instance travels as a part of said current from its place of introduction to the place of withdrawal adjacent the next incoming stream.

PHILLIPS K. SCHWARTZ.