

Aug. 19, 1930.

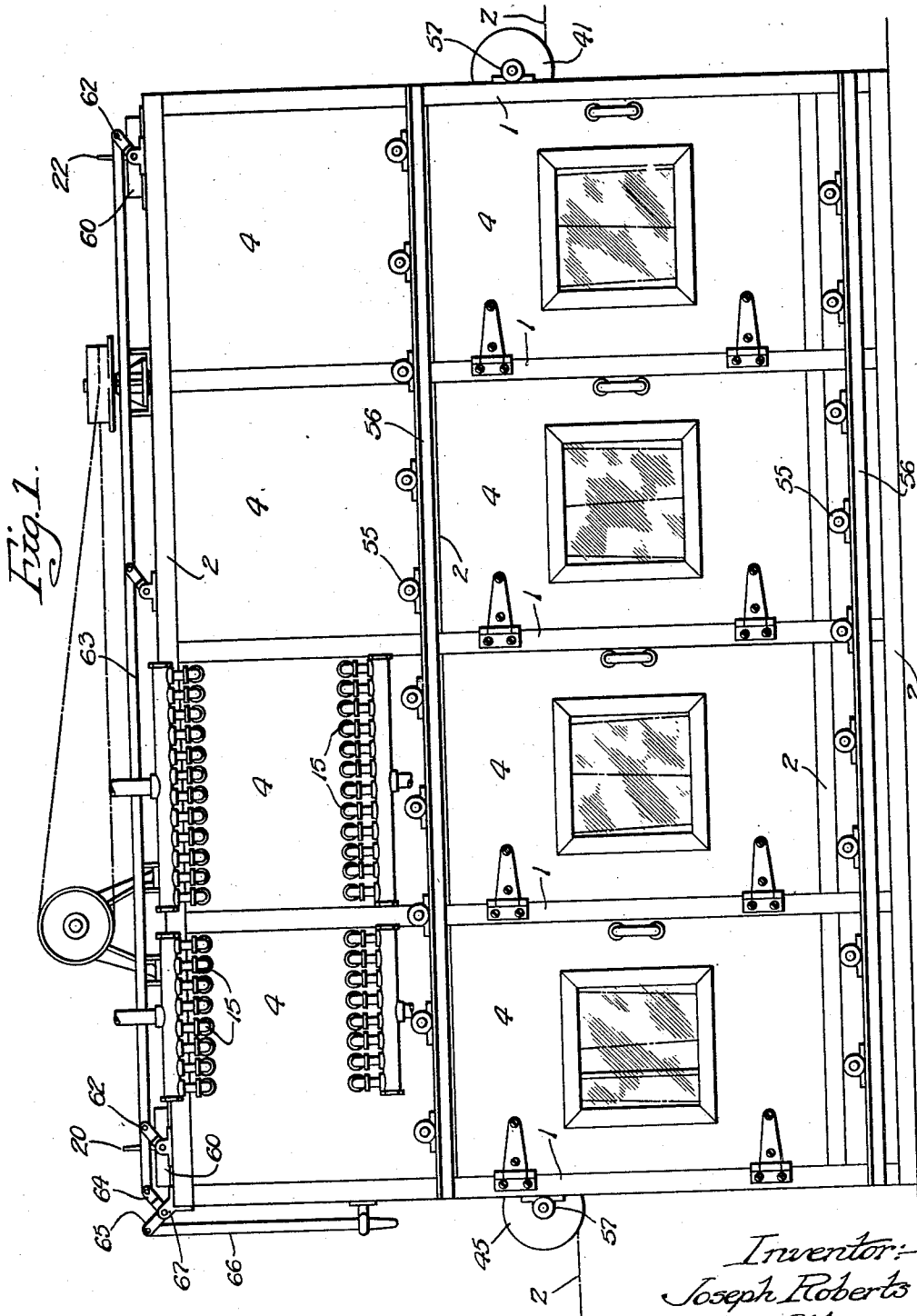
J. ROBERTS

1,773,642

SLASHER DRIER

Filed Oct. 22, 1928

4 Sheets-Sheet 1



Inventor:
Joseph Roberts
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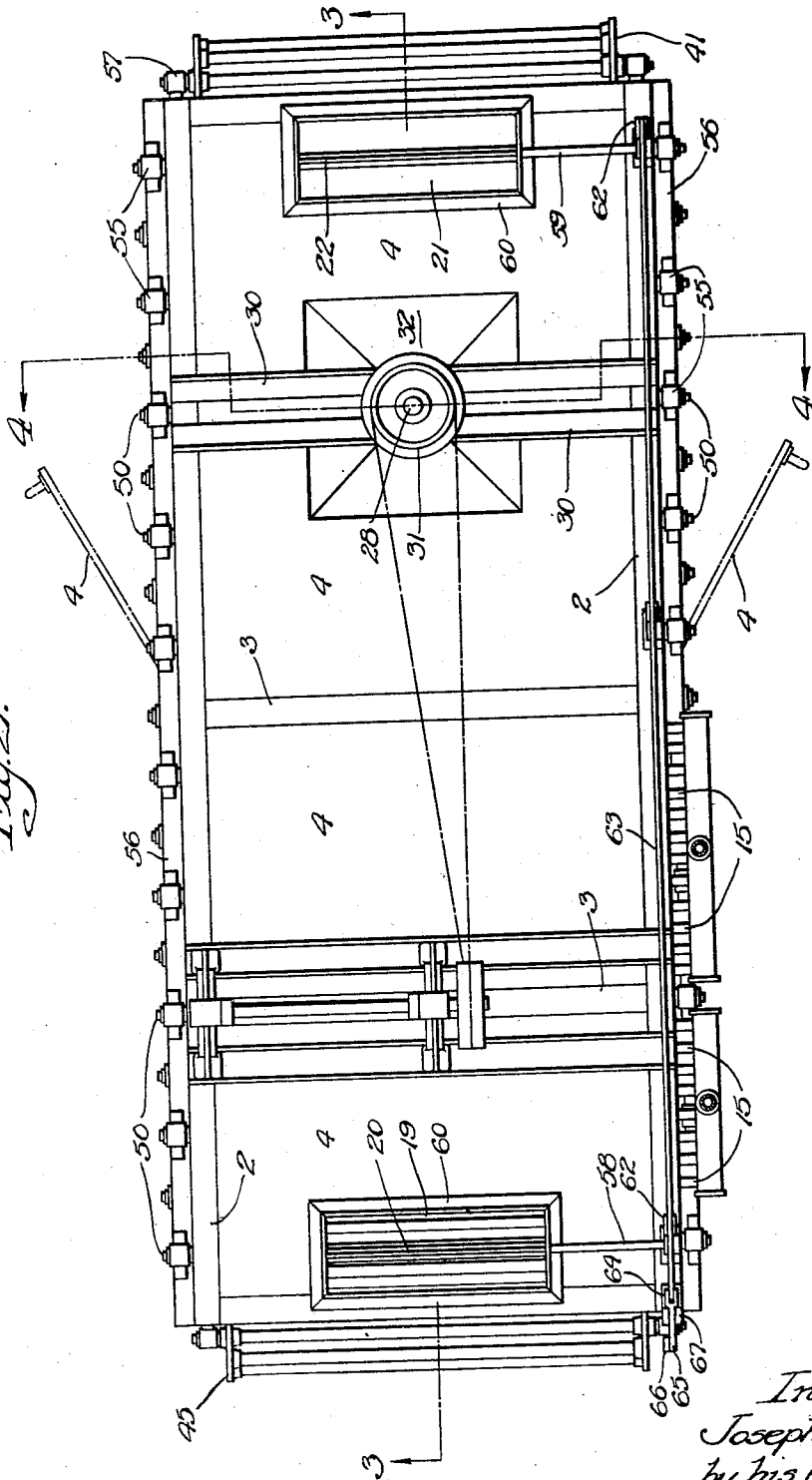
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Fig. 2.



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Fig. 6.

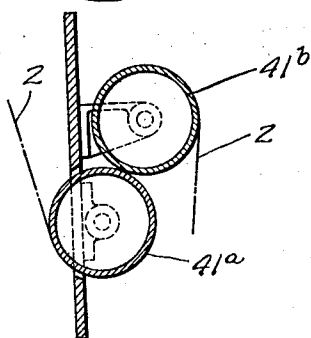


Fig. 5.

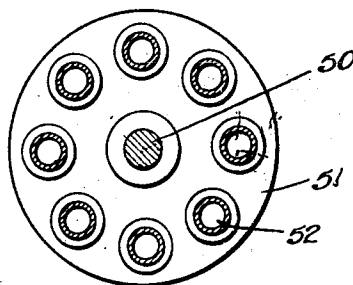
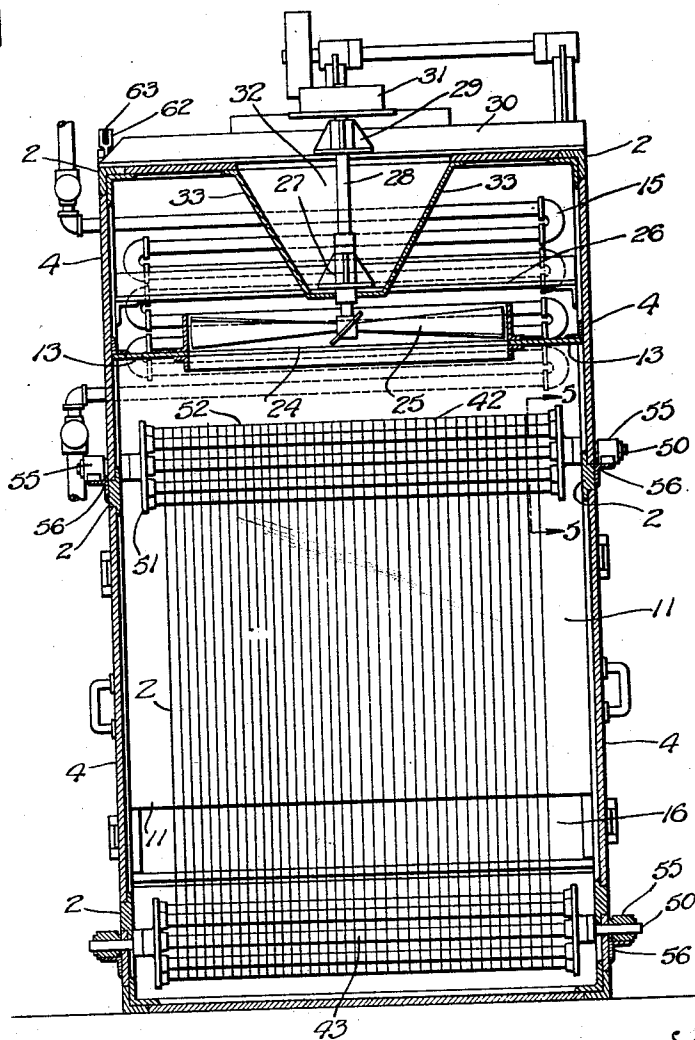


Fig. 4.



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UNITED STATES PATENT OFFICE

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SLASHER DRIER

Application filed October 22, 1928. Serial No. 314,107.

The object of my invention is to provide a simple and efficient construction for a drying machine especially adapted for the drying of warps which, in passing through the slasher operation, have had a liquid sizing, dye, or both, applied thereto.

One feature of the invention is the provision of a drying chamber with means for circulating air in the drying chamber and means for heating the air in circulation, together with means for supporting the warp threads in the drying chamber in such a manner that the circulating air in the chamber moves substantially longitudinally of the threads; and the thread supporting means is so arranged that the warp threads alternately move in the same general direction as the direction of movement of the air and then in an opposite direction to the direction of movement of the air.

In this manner lateral strain on the threads is reduced to a minimum and tangling or lapping of adjacently positioned threads of the warp is obviated, and the air is more effectively forced into the fibres of the threads to quickly drive the moisture out of the threads.

Another feature of the invention is the arranging of the thread guides in such a manner that the direction of movement of the threads relative to the direction of movement of the air is changed at short intervals and that these guides are so arranged that the threads, while moving in the same general direction or in an opposite direction to the travel of the air currents, cross the air currents at a slight angle, in order that practically all the air circulating in the drying chamber will be brought into contact with the threads.

Making the respective alternating runs of the warp short permits the drier to be made more compact for a given capacity and eliminates the traveling of the air any great distance from its source of heat at any time, thus the air can be maintained at a more uniform temperature.

Another feature of the invention is the provision of a fresh air inlet and an outlet for moist air, so arranged that like amounts of

air pass through the inlet and outlet simultaneously.

Another feature is the placing of the air outlet at the yarn-receiving end of the apparatus and the air inlet at the yarn-discharge end of the apparatus and so arranging the warp guides that the yarn in leaving the apparatus will pass through the incoming fresh air, whereby it is properly cooled before leaving the drier.

Referring to the accompanying drawings:

Fig. 1 is a side elevation of the drier;

Fig. 2 is a plan view;

Fig. 3 is a longitudinal sectional elevation taken on the line 3—3, Fig. 2;

Fig. 4 is a transverse sectional elevation taken on the line 4—4, Fig. 2;

Fig. 5 is an enlarged sectional view of one of the warp guides; and

Fig. 6 illustrates a modification of the invention.

The machine comprises a suitable open framework consisting of upright posts 1, longitudinal stringers 2, and transverse stringers 3. Suitable panels 4 are secured to the frame to form the casing of the machine.

The interior of the casing is divided into a drying chamber 10, which is sub-divided into compartments 10^a and 10^b by a transversely extending vertical partition 11, and a heating chamber 12 which is separated from the drying compartment 10^a by a horizontal partition 13, which extends transversely of the casing and from the central partition 11 to the warp-receiving end A of the casing.

Heating coils 15 of any suitable character are positioned above the compartment 10^b of the drying chamber 10.

Adjacent the warp-delivery end B, the casing is provided with a vertical partition 14 which extends from the roof of the casing to a point adjacent the floor thereof, as shown in Fig. 3.

The partition 11 extends from the horizontal partition 13 to a point adjacent the floor of the casing, providing communication between the compartments 10^a and 10^b of the drying chamber 10 through the opening 16.

The partition 14 forms at the warp-discharging end B of the casing a fresh air

conduit 17 which communicates through the opening 18 with the compartment 10^b of the drying chamber 10.

An air inlet 19 is formed in the roof of the casing and communicates with the fresh air conduit 17, the passage of air to the said conduit being regulated by a damper 20.

In the opposite end of the roof of the casing is a moist air outlet 21 which communicates with the end of the heating chamber 12, at the most distant point from the heating coils 15. The passage of air through the outlet 12 is regulated by a damper 22.

In the horizontal partition 13 is a suitable opening 24 in which is rotatably mounted a fan 25 by means of which the air in the casing is circulated in the general direction indicated by the arrows *x*, Fig. 3.

A transverse beam 26 supports a bearing 27 in which one end of the shaft 28 is rotatably mounted. The fan 25 is secured to the shaft 28 adjacent the beam 26. The upper end of the shaft 28 is rotatably mounted in a bearing 29 carried by a transverse beam 30, a pulley 31 being secured to the shaft 28 adjacent the upper end of the bearing 29, by means of which the fan 25 is rotated.

The bearing 27 is set in a well 32 depending from the roof of the casing, the well comprising four angularly disposed walls 33 secured at one end to the roof of the casing and at the opposite end to the beam 26.

The warp threads *Z* enter the end A of the casing through a transversely extending slot 40, passing around a rotary guide 41, from which the warp passes upwardly over the first rotary guide 42 of an upper series of guides, thence downwardly and under and around the first rotary guide 43 of a lower series of guides, and then alternately over and under the remaining guides of the two series respectively, as shown in Fig. 3, passing out of the casing through a transversely extending slot 44 formed in the delivery end B of the casing. The warp threads in leaving the casing pass under a rotary guide 45 located in the slot 44.

The warp threads *Z* pass from the compartment 10^a of the casing 10 to the compartment 10^b thereof around one of the lower guides, indicated at 43^a which is located in the passage 16 formed between the lower edge of the partition 11 and the floor.

Another of the lower series of guides, that which is indicated at 43^b, is positioned in the passage 18 formed between the lower edge of the partition 14 and the floor. The guide 43^b directs the warp *Z* from the compartment 10^b of the drying chamber into the fresh air duct or cooling compartment 17.

It will be noted that the adjacent runs of warp threads extending between the upper and lower guides are not parallel to each other but are disposed at a slight angle with respect to each other, thus the air currents

while they move in a general direction substantially longitudinally of these runs of threads the air currents are also caused to cross the threads at a slight angle, which brings practically all the air in the casing into contact with the threads and also obviates the lateral strain on the threads, such as is produced when the runs of threads are subjected to currents of air passing them at right angles to their length.

Each of the warp guides is made in the form of an open, perforated or slatted cylinder, for the purpose of reducing air resistance as much as possible. Each guide comprises a shaft 50 on which are secured heads 51, 51 adapted to receive the opposite ends respectively of a series of rods or tubes 52, 52. The warp threads rest on these rods or slats 52 between the heads 51, 51 of the cylinders.

The shafts 50 of the upper and lower series of guides are rotatably mounted in bearings 55 supported by and secured to longitudinally extending beams 56 which are suitably secured to the frame of the casing.

The guides 41 and 45 located at the receiving and delivery ends of the casing are rotatably mounted in bearings 57 secured to the ends of the casing.

The dampers 20 and 22 are respectively secured to shafts 58 and 59, which are rotatably mounted in flanged fittings 60 surrounding the inlet and outlet openings 19 and 21 and bearings 61 secured to the top of the casing adjacent one side thereof. On one end of each of the shafts 58 and 59 is secured an arm 62. The arms 62, 62 are connected by a link 63 and one end of this link is connected to one arm 64 of a bell-crank lever, the other arm 65 of which is connected to an operating rod 66. By this means the dampers 20 and 21 are synchronously operated to control the inlet of fresh air in the same proportion as the discharge of moist air from the casing. The bell-crank lever 64, 65 is pivoted on a bracket 67 secured to the casing at one end thereof.

From the above description the operation of the drier will be obvious, the warp threads *Z* upon entering the drying chamber 10 move in a zig-zag path up and down around the upper and lower guides 42 and 43, passing from the compartment 10^a to the compartment 10^b of the drying chamber under the partition 11. The zig-zag vertical travel of the warps continues through the compartment 10^b, from whence the warps travel around the guide 43^b under the partition 14 unto the fresh air compartment or duct 17.

The air is drawn in an upward vertical direction through and from the compartment 10^a by the fan 25 and passes horizontally through the heating chamber 12 and heating coils 15. From the coils 15 the heated air passes in a downward vertical direction

through the compartment 10^b, then horizontally through the opening 16, under the partition 11, to the compartment 10^a for a repeat of the cycle.

During the circulation of the air as above noted, the air passes through the series of warp threads in substantially the same plane in which the threads are longitudinally disposed, the air currents moving in a direction longitudinally of the threads and at a slight angle relative thereto, due to the zig-zag positioning of the threads in the casing.

During the circulation of the air through the casing a portion of the moist air is exhausted from the casing at the warp-receiving end of the casing where the air is necessarily more moist, and at the same time an equal amount of fresh air is admitted to the casing at the warp-delivery end thereof, adjacent the heating coils, where the air is practically dry.

The warp threads Z leave the compartment 10^b at the drier and warmer end thereof and pass through the fresh air compartment 17 wherein they are cooled before being discharged from the casing.

In drying warps which have been sized it is sometimes advisable to "set" the sizing as the warp threads enter the drying chamber. In such cases the receiving cylinder 41 may be replaced by a suitable heated drum, or series of drums, preferably a hollow drum into which steam is admitted. In passing around the heated drum the sizing is immediately set to such an extent that it will adhere to the thread and not to the guides and, therefore, will not build up on the guides as the warp passes through the drier. Such a construction as above noted is illustrated in Fig. 6, which shows a pair of steam drums 41^a and 41^b between and around which the wet sized warp threads Z pass when entering the drying chamber.

The arrangement of guides, partitions, heating coils, and fan is such that the whole drier may be constructed as a very compact apparatus in which the air at no time is required to travel any great distance from the heating coils which permits the use of relatively small coils requiring less steam for heating the drying air.

I claim:

1. In a slasher drier, the combination of a casing, means for circulating a current of air in a predetermined direction within the casing, means for supporting a plurality of warp threads within the casing in a direction substantially coincident with the direction of movement of the circulating air in the casing but at a slight angle with respect to the line of movement of the air, means for heating the air in circulation adjacent one end of the casing, means for admitting fresh air to the casing at the heating end thereof, means for discharging moist air from the

casing at the opposite end thereof, and means for synchronously controlling the amounts of air passing into and out of said casing.

2. In a slasher drier, the combination of a casing having a longitudinally extending drying chamber and an air heating chamber formed therein, a series of thread guides spaced apart adjacent the top of said drying chamber, a series of threaded guides spaced apart adjacent the bottom of said drying chamber, the threads to be dried passing around the guides of both series in alternating succession through the drying chamber, a vertical partition in said drying chamber dividing the same into separate compartments, a horizontal partition at the top of one of said compartments between the drying chamber and the heating chamber, a heating coil at the top of the second compartment, a circulating fan located in an aperture formed in the said horizontal partition whereby air is circulated through the separate compartments of the drying chamber casing substantially longitudinally of the warp threads supported in said compartments, through the heating coil located above one of said compartments, a second partition extending vertically through the casing adjacent the said heating coil and extending downwardly into the said drying chamber from the roof thereof to a point adjacent the bottom thereof whereby a cooling chamber is provided at one end of the casing, said warp threads passing under said partition from the drying chamber to the cooling chamber, and means for admitting fresh air to said cooling chamber from outside said casing.

3. In a slasher drier, the combination of a casing having a longitudinally extending drying chamber and an air heating chamber formed therein, a series of thread guides spaced apart adjacent the top of said drying chamber, a series of thread guides spaced apart adjacent the bottom of said drying chamber, the threads to be dried passing around the guides of both series in alternating succession through the drying chamber, a vertical partition in said drying chamber dividing the same into separate compartments, a horizontal partition at the top of one of said compartments between the drying chamber and the heating chamber, a heating coil at the top of the second compartment, a circulating fan located in an aperture formed in the said horizontal partition whereby air is circulated through the separate compartments of the drying chamber casing substantially longitudinally of the warp threads supported in said compartments, through the heating coil located above one of said compartments, a second partition extending vertically through the casing adjacent the said heating coil and extending downwardly into the said drying chamber to a point adjacent the bottom thereof whereby a cooling cham-

ber is provided at one end of the casing, said warp threads passing under said partition from the drying chamber to the cooling chamber, means for admitting fresh air to said cooling chamber from outside said casing, and means for exhausting moist air from said heating chamber at the opposite side of said casing.

4. In a slasher drier, the combination of a casing having a longitudinally extending drying chamber and an air heating chamber formed therein, a series of thread guides spaced apart adjacent the top of said drying chamber, a series of thread guides spaced apart adjacent the bottom of said drying chamber, the threads to be dried passing around the guides of both series in alternating succession through the drying chamber, a vertical partition in said drying chamber dividing the same into separate compartments, a horizontal partition at the top of one of said compartments between the drying chamber and the heating chamber, a heating coil at the top of the second compartment, a circulating fan located in an aperture formed in the said horizontal partition whereby air is circulated through the separate compartments of the drying chamber casing substantially longitudinally of the warp threads supported in said compartments, through the heating coil located above one of said compartments, a second partition extending vertically through the casing adjacent the said heating coil and extending downwardly into the said drying chamber to a point adjacent the bottom thereof whereby a cooling chamber is provided at one end of the casing, said warp threads passing under said partition from the drying chamber to the cooling chamber, means for admitting fresh air to said cooling chamber from outside said casing, means for exhausting moist air from said heating chamber at the opposite side of said casing, and means for synchronously controlling the amounts of air simultaneously entering and leaving the casing.

5. In a slasher drier, the combination of a casing, a partition extending transversely of said casing and vertically with respect thereto from a point above the floor of said casing to a point spaced below the roof thereof, a horizontal partition extending from the top of said vertical partition to and abutting against one of the end walls of said casing, a second partition spaced from the opposite end wall of said casing and extending vertically through the casing from the roof thereof to a point spaced above the floor thereof, a heating coil located in said casing adjacent the roof thereof and intermediate the two said vertical partitions, a lower series of thread guides located adjacent the floor of said casing, one of said thread guides being located below and in line with each of the said vertical partitions, an upper se-

ries of thread guides located under the said horizontal partition and the said heating coil one of said upper series being located in the space formed between the second said vertical partition and the end wall of the casing adjacent thereto, said warp threads entering said casing through an opening formed in the end wall which the horizontal partition abuts and passing around the thread guides of both series in alternating succession through the casing, leaving the said casing through an opening formed in the wall at the opposite end of said casing, and a fan operative in an opening formed in the said horizontal partition for circulating air in said casing substantially longitudinally of the threads supported in the casing.

6. In a slasher drier, the combination of a casing, a partition extending transversely of said casing and vertically with respect thereto from a point above the floor of said casing to a point spaced below the roof thereof, a horizontal partition extending from the top of said vertical partition to and abutting against one of the end walls of said casing, a second partition spaced from the opposite end wall of said casing and extending vertically through the casing from the roof thereof to a point spaced above the floor thereof, a heating coil located in said casing adjacent the roof thereof and intermediate the two said vertical partitions, a lower series of thread guides located adjacent the floor of said casing, one of said thread guides being located below and in line with each of the said vertical partitions, an upper series of thread guides located under the said horizontal partition and the said heating coil one of said upper series being located in the space formed between the second said vertical partition and the end wall of the casing adjacent thereto, said warp threads entering said casing through an opening formed in the end wall which the horizontal partition abuts and passing around the thread guides of both series in alternating succession through the casing, leaving the said casing through an opening formed in the wall at the opposite end of said casing, a fan operative in an opening formed in the said horizontal partition for circulating air in said casing substantially longitudinally of the threads supported in the casing, and means for admitting fresh air into the casing through the space formed between the second said vertical partition and the adjacent end wall of the casing.

7. In a slasher drier, the combination of a casing, a partition extending transversely of said casing and vertically with respect thereto from a point above the floor of said casing to a point spaced below the roof thereof, a horizontal partition extending from the top of said vertical partition to and abutting against one of the end walls of said casing, a second partition spaced from the opposite

end wall of said casing and extending vertically through the casing from the roof thereof to a point spaced above the floor thereof, a heating coil located in said casing adjacent the roof thereof and intermediate the two said vertical partitions, a lower series of thread guides located adjacent the floor of said casing, one of said thread guides being located below and in line with each of the said vertical partitions, an upper series of thread guides located under the said horizontal partition and the said heating coil one of said upper series being located in the space formed between the second said vertical partition and the end wall of the casing adjacent thereto, said warp threads entering said casing through an opening formed in the end wall which the horizontal partition abuts and passing around the thread guides of both series in alternating succession through the casing, leaving the said casing through an opening formed in the wall at the opposite end of said casing, a fan operative in an opening formed in the said horizontal partition for circulating air in said casing substantially longitudinally of the threads supported in the casing, means for admitting fresh air into the casing through the space formed between the second said vertical partition and the adjacent end wall of the casing, and means at the opposite end of the casing above the said horizontal partition for exhausting moist air from the casing.

8. In a slasher drier, the combination of a casing, a partition extending transversely of said casing and vertically with respect thereto from a point above the floor of said casing to a point spaced below the roof thereof, a horizontal partition extending from the top of said vertical partition to and abutting against one of the end walls of said casing, a second partition spaced from the opposite end wall of said casing and extending vertically through the casing from the roof thereof to a point spaced above the floor thereof, a heating coil located in said casing adjacent the roof thereof and intermediate the two said vertical partitions, a lower series of thread guides located adjacent the floor of said casing, one of said thread guides being located below and in line with each of the said vertical partitions, an upper series of thread guides located under the said horizontal partition and the said heating coil one of said upper series being located in the space formed between the second said vertical partition and the end wall of the casing adjacent thereto, said warp threads entering said casing through an opening formed in the end wall which the horizontal partition abuts and passing around the thread guides of both series in alternating succession through the casing, leaving the said casing through an opening formed in the wall at the opposite end of said casing, a fan operative in an

opening formed in the said horizontal partition for circulating air in said casing substantially longitudinally of the threads supported in the casing, said casing having an opening affording communication between the atmosphere outside the casing and the space between the second said vertical partition and the adjacent end wall, and a second opening at the opposite end of the affording communication between the atmosphere outside the casing and the space between the horizontal partition and the roof of the casing, a damper in each of said openings, and means for synchronously operating said dampers.

9. In a slasher drier, the combination of a casing having a drying chamber, an opening in one end of the casing through which warp threads enter the drying chamber and an opening in the opposite end of the casing through which the warp threads leave the casing, a series of rotary slatted thread guides adjacent one side of the drying chamber, a second series of rotary slatted thread guides adjacent the opposite side of said drying chamber, a rotary thread guide in each of the entrance and exit openings in the ends of the casing, said warp threads passing around the said rotary thread guides of both series in alternating succession throughout the drying chamber, means for circulating air in said drying chamber in a direction substantially longitudinally of the said warp threads, and means for heating the rotary thread guide at the entrance end of the casing, said rotary thread guide comprising a hollow cylinder adapted to receive a heating fluid.

JOSEPH ROBERTS.

CERTIFICATE OF CORRECTION.

Patent No. 1,773,642.

Granted August 19, 1930, to

JOSEPH ROBERTS.

It is hereby certified that the name of the assignee in the above numbered patent was erroneously written and printed as "Procter and Schwartz, Incorporated", whereas said name should have been written and printed as Proctor and Schwartz, Incorporated, as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of October, A. D. 1930.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.