May 19, 1925. 1,538,863

E. B. KERST

WARP DRIER

Filed Nov. 18, 1924 2 Sheets-Sheet 1

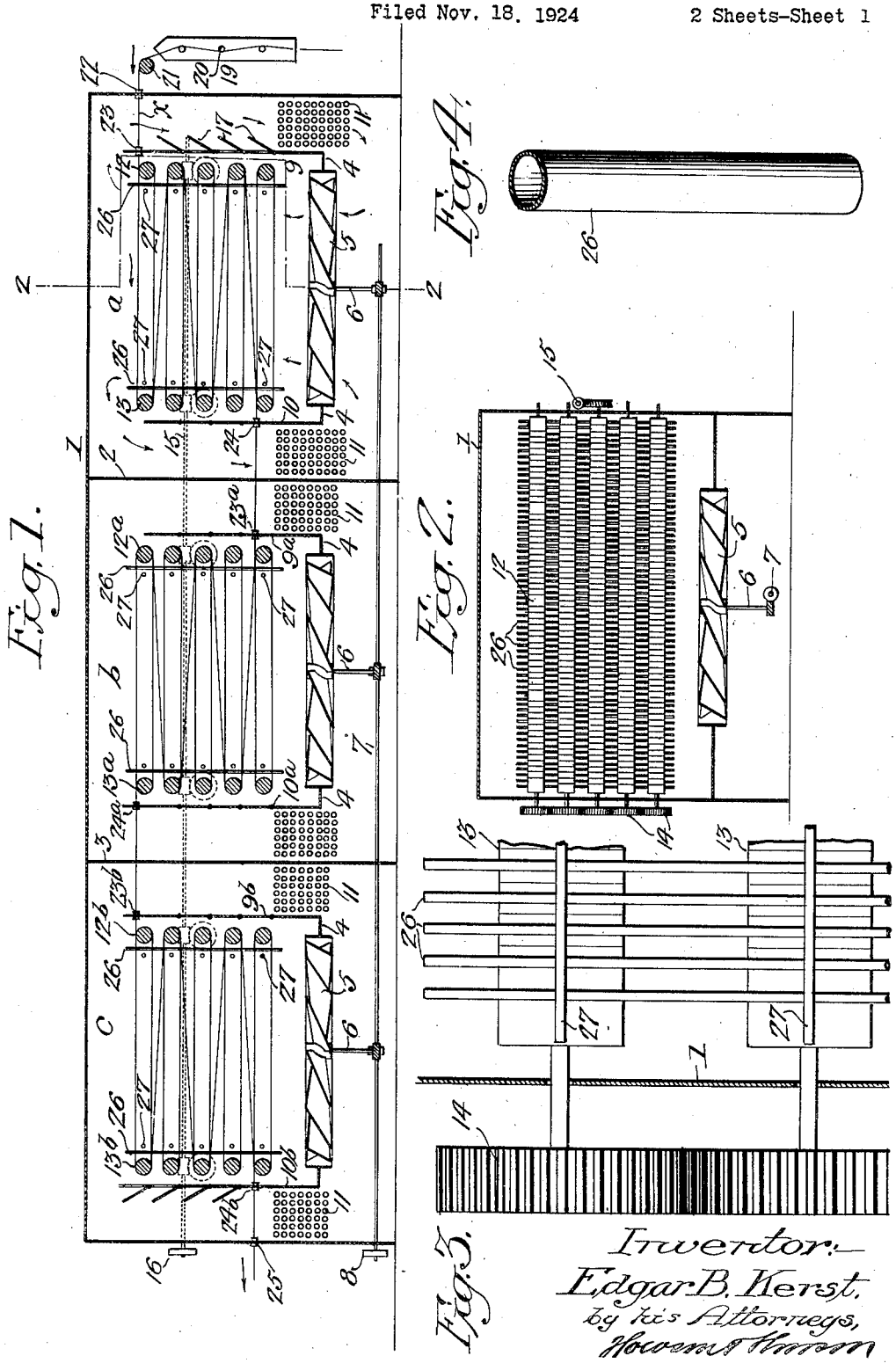


Fig. 1.

Fig. 4.

Fig. 2.

Fig. 3.

Inventor:
Edgar B. Kerst,
by his Attorneys,
Howson & Howson

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Filed Nov. 18, 1924 2 Sheets-Sheet 2

Fig. 6.

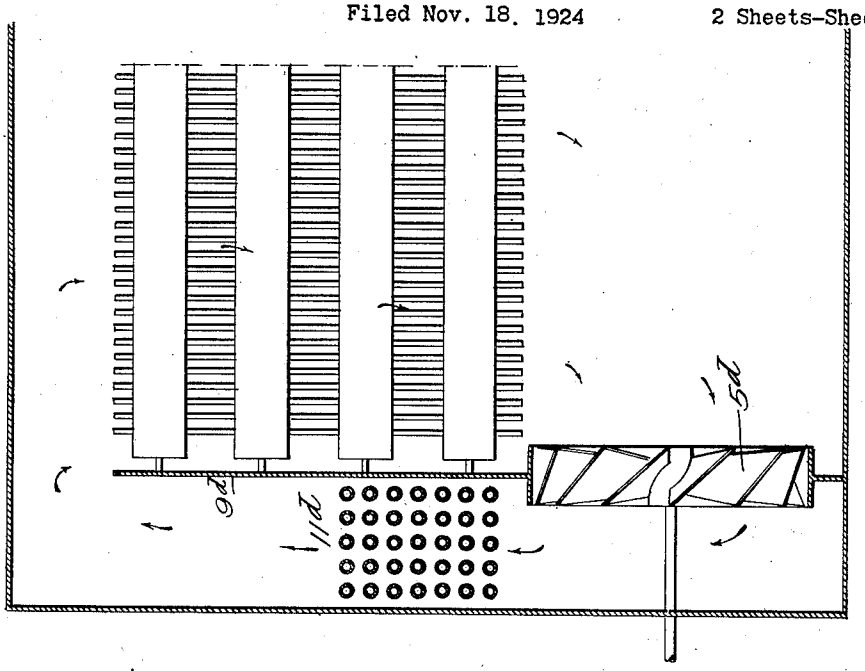
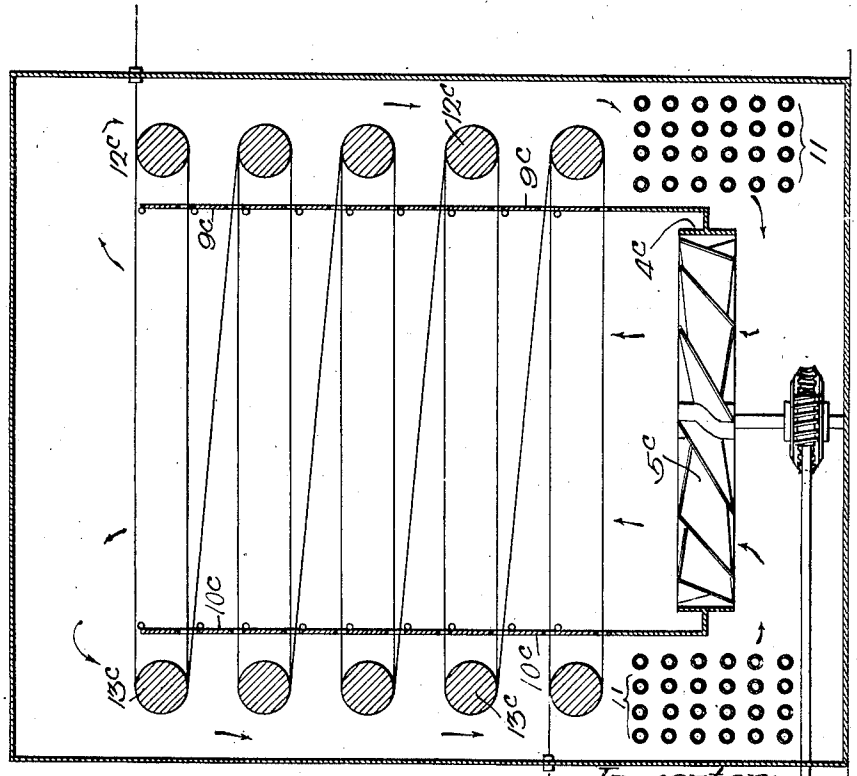


Fig. 5.



Inventor:
Edgar B. Kerst,
by his Attorneys,
Howson & Howson

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UNITED STATES PATENT OFFICE.

EDGAR B. KERST, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO PROCTOR & SCHWARTZ, INCORPORATED, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

WARP DRIER.

Application filed November 18, 1924. Serial No. 750,585.

To all whom it may concern:

Be it known that I, EDGAR B. KERST, a citizen of the United States, residing in Providence, Providence County, Rhode Island, have invented certain Improvements in Warp Driers, of which the following is a specification.

My invention relates to certain improvements in apparatus for drying warps and strands of other materials, such as tapes, and small tubular fabrics.

One object of the invention is to design the drying apparatus so that the warps span the space between two series of supports to allow heated air in circulation to dry the warps as it circulates through the space and as the warps are traversed through the apparatus.

A further object of the invention is to provide means for traversing the warps continuously through one or more compartments in which air is in circulation.

A still further object of the invention is to provide tension for the warps as they pass through the apparatus.

The improved apparatus can be used for drying, conditioning and cooling warps, or other material, if desired.

In the accompanying drawings:

Fig. 1 is a longitudinal sectional view of a warp drier, illustrating my invention;

Fig. 2 is a transverse sectional view on the line 2—2, Fig. 1;

Fig. 3 is an enlarged sectional view, showing the means for separating the several strands and warps;

Fig. 4 is a sectional perspective view of one of the enameled tubular warp separators;

Fig. 5 is a longitudinal sectional view illustrating a form of apparatus, in which the rollers are located outside of the vertical partitions; and

Fig. 6 is a transverse sectional view of a drier, illustrating a modification of the air circulating means.

Referring to Figs. 1, 2 and 3, the casing 1 of the drier may be of any form desired. In the present instance, it is divided into three compartments *a*, *b* and *c* by vertical partitions 2 and 3. In the bottom of each compartment of the drier is a horizontal partition 4, which has a cylindrical opening for a fan 5. Each fan is mounted on a vertical shaft 6, which is driven by gearing from a longitudinal shaft 7 that extends through one end of the drier casing. On this projecting portion is a belt wheel 8.

In the compartment *a* are two vertical partitions 9 and 10, which are connected to the partition 4 in the lower portion of the compartment. Between the partitions 9 and 10 and the ends of the compartment are heating pipes 11 for heating the air circulated by the fan 5. Also within the compartment *a*, in the channel between the two vertical partitions 9 and 10, are two stands of rollers 12 and 13. The stands of rollers are spaced apart so that the warps being dried span the channel through which passes the air in circulation. The rollers of each stand are separated as shown in the drawings. The several rollers are geared together by gear wheels 14, Fig. 2. Each stand is driven by worm gearing (shown by dotted lines in Fig. 1) from a longitudinal shaft 15, which extends through one end of the drier and is provided with a belt pulley 16.

The vertical partitions 9 and 10 may be made solid, but it is preferred to provide pivoted doors 17 so that access can be had to the warps and rollers when threading the warps on the rollers.

A tension device 19 is provided having a series of bars 20, over which the warp threads pass to a roller 21 and into the drier through eyes 22. The warp threads then pass into the partitions 9 in the first compartment *a* through eyes 23, after which they pass around the two stands of rollers 12 and 13 and then through an eye 24 in the partition 10 and through the partition 2 into the second compartment *b* where there are stands of rollers 12^a and 13^a around which the warps pass and through eyes 23^a, and 24^a, in the partitions 9^a and 10^a. The eyes 24^a are at the upper end of the partition 10^a and the warps pass through these eyes and through the partition 3 and through eyes 23^b in the compartment *c* and around the rollers of the stands 12^b and 13^b. The

warps pass from the rollers through the eyes 24^b and out of the drier through the eyes 25.

Near each stand of rollers are warp separators 26, which are arranged vertically, as shown in Fig. 2. Opposite each roller are transverse warp separators 27. These separators are made of tubes enameled on the outer surface, as illustrated in Fig. 4, and retain the warps in proper position on the rollers so that they do not become entangled.

In Fig. 1 is shown a three compartment drier. In each compartment heated air—at any degree desired—is circulated through the channel, which is spanned by the warp threads. The air returns in the channels between the partitions and the walls of the compartments, passing through the coils of heating pipes to the fans.

In some instances, the number of the drying compartments may be increased or decreased. One compartment may be a conditioning compartment and another a cooling compartment. In each case, however, the stands of rollers are separated so that the warps span a space through which air is circulated. The heat is regulated in the ordinary manner and moisture may be added, when necessary.

In the present instance, four warps are passed simultaneously through the drier. The width of the drier depends upon the number of warps that it is desired to dry simultaneously. The warps after they pass through the drier are coiled by any standard coiling device.

In Fig. 5 is shown a drier having a single compartment, in which the stands of rollers 12^c and 13^c are located in the spaces between the partitions 9^c and 10^c. The warps pass through openings in the partitions, which have a series of hinged doors that can be moved when it is necessary to thread the warps around the rollers.

The fan 5^c is located in an opening in the partition 4^c in the same manner as the fans shown in Fig. 1. This arrangement may be duplicated in a manner similar to that shown in Fig. 1.

In Fig. 6 is shown a modification of the arrangement of the circulating means. In this construction, a longitudinal partition 9^d is provided to form a circulating chamber at one side of the drying chamber. In an opening in this partition is a circulating fan 15^d, which circulates the air in the manner shown by the arrows. The air is heated by a coil of steam pipes 11^d in the circulating chamber.

I claim:

1. The combination in a drying machine for warps, &c., of a casing enclosing a compartment; means for circulating heated air in the compartment; two stands of rollers spaced apart and located in said compartment; and means for driving said rollers, the warps, or other material, passing around said rollers and across the space between the two stands of rollers through which the heated air circulates.

2. The combination in a drying machine for warps, &c., of a casing enclosing a drying compartment; two stands of rollers in said compartment around which the warps pass as they move through the drying machine; vertical partitions forming channels for the air in circulation; and a fan for circulating the air.

3. The combination in a drying machine for warps, &c., of a casing enclosing a drying compartment; a horizontal partition near the bottom of the compartment; vertical partitions spaced from each end of the compartment to form a central channel and two end channels; and two stands of rollers located at each end of the central channel having a clear space for the circulation of air, the warps, as they pass through the drying machine, passing around the rollers and across the channels.

4. The combination in a warp drying apparatus, of a series of compartments through which the warps pass; two stands of rollers in each compartment, the stands being spaced apart; a circulating fan in each compartment; and means for feeding the warps through the compartments and around the rollers in each compartment, the warps spanning the main air channel in each compartment.

5. The combination of a warp drier separated into a series of compartments; heating means in each compartment; circulating fans for circulating air in each compartment; two stands of rollers in each compartment around which the warps pass; vertical partitions in each compartment between a stand of rollers and the end of the compartment; and eyes in the partitions through which the warps pass.

6. The combination in a warp drier, of a drying compartment having a horizontal partition near the bottom thereof, said partition having a fan opening; a fan located in the opening; means for driving the fan; vertical partitions spaced from the ends of the compartment; heating pipes in the spaces between the vertical partitions and the ends of the compartment; two series of rollers located in the space between the partitions, said rollers being spaced apart to allow the warps to pass around the rollers; and vertical and horizontal separators at the said rollers for separating the strands of warps.

7. The combination in a warp drier, of a compartment; means for circulating and heating the air in the compartment; two stands of rollers spaced apart and around which the warps pass; vertical partitions in the compartment; a tension device for regu-

lating the tension of the warps as they pass to the drying compartment; and means for driving the rollers of the stands.

8. The combination in a warp drier, of a series of compartments; means for circulating and heating the air in the compartments; two stands of rollers in said compartments; means for driving the rollers of each stand so as to carry the warps positively through the drier; means for separating the strands of warps; and a tension device, at the feed end of the drier, for applying tension to the warps as they pass to the drier.

EDGAR B. KERST.