

(No Model.)

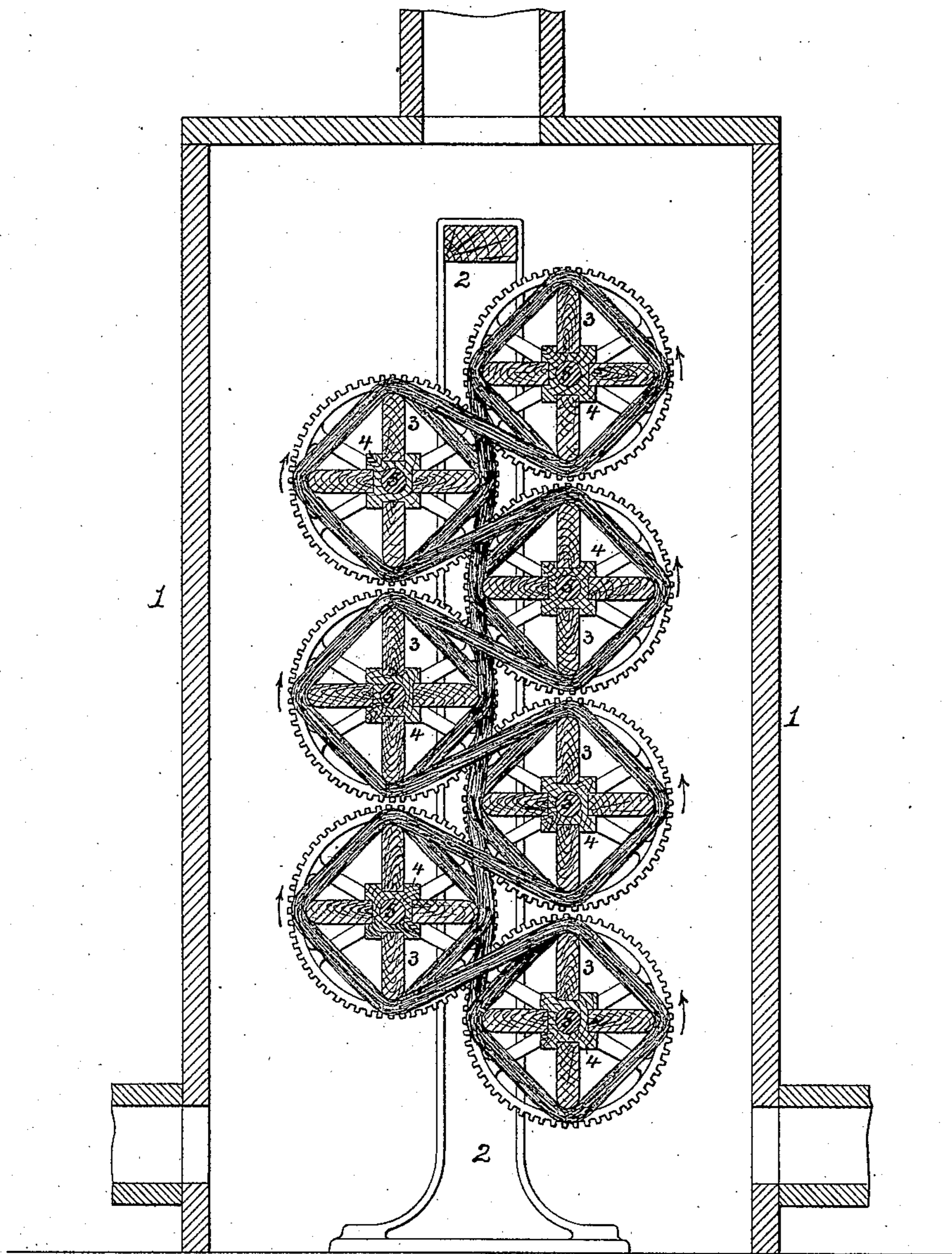
2 Sheets—Sheet 1.

F. TURNBULL.  
WARP DRYING MACHINE.

No. 574,289.

Patented Dec. 29, 1896.

FIG. 1.



Witnesses:

*Chas. D. Goodwin*  
*F. C. Bechtold*

Inventor:

*Frederick Turnbull*  
by his Attorneys  
*Hawson & Hawson*

(No Model.)

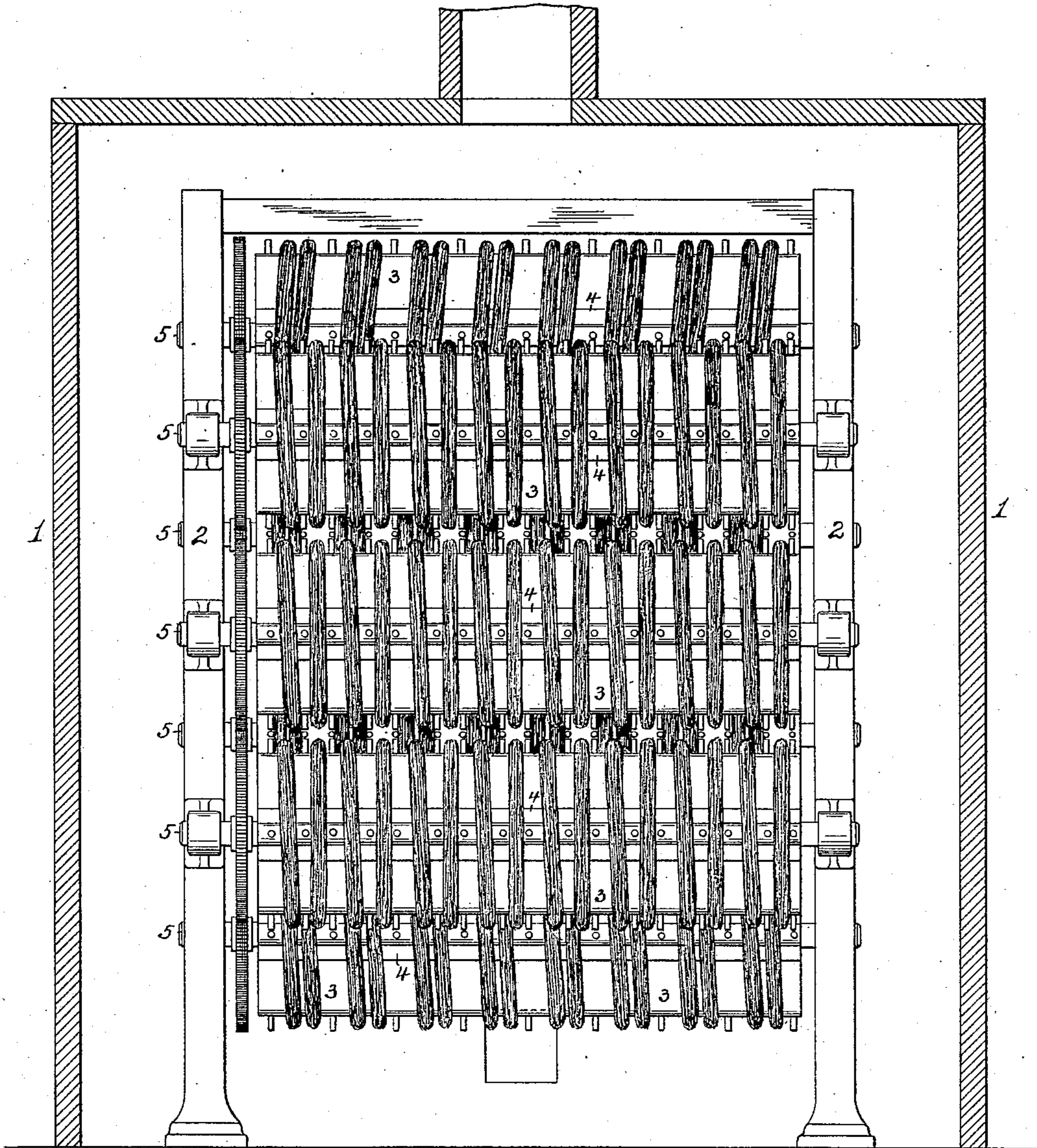
2 Sheets—Sheet 2.

F. TURNBULL.  
WARP DRYING MACHINE.

No. 574,289.

Patented Dec. 29, 1896.

FIG. 2.



Witnesses:  
*C. D. Goodwin*  
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*Frederick Turnbull*  
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*Howson & Howson*

# UNITED STATES PATENT OFFICE.

FREDERICK TURNBULL, OF PHILADELPHIA, PENNSYLVANIA.

## WARP-DRYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 574,289, dated December 29, 1896.

Application filed July 9, 1896. Serial No. 598,597. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK TURNBULL, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Warp-Drying Machines, of which the following is a specification.

The object of my invention is to so construct a warp-drying apparatus as to prevent injury to or deterioration of the warp, such as is caused when the warp is dried by contact with heated cylinders in the usual manner, a further object being to effect the drying of the warp without entanglement or breaking of any of the threads of which it is composed. These objects I attain in the manner herein-after set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a transverse section of warp-drying apparatus constructed in accordance with my invention, and Fig. 2 is a longitudinal section of the same.

1 represents a box or casing of any available material having suitable inlets and outlets for heated air, and also having within it vertical standards 2, which carry the bearings for the shafts of a stack of warp-carriers, the stack in the present instance comprising four carriers in one row and three in another, although the number and disposal of the warp-carriers may be varied as desired.

Each of the warp-carriers, instead of being in the form of a metal drum or cylinder, as usual, is composed of a series of radiating blades or paddles 3, of wood or of metal, with wooden outer ends, these blades or paddles projecting from a central hub 4, secured to one of the shafts 5 of the stack, said shafts being suitably geared together, so as to rotate at the same speed and in the directions pointed out by the arrows in Fig. 1.

The warp-threads are bunched into rope-like form and are passed around the various warp-carriers in the direction of the arrows, the threads being supported by the outer edges of the blades 3, as clearly indicated in Fig. 3. When the opposite ends of the warp bunch or rope are connected together, the warp practically forms an endless rope or band and may be caused to travel indefinitely around the carriers in the course indicated by the arrows as said carriers are ro-

tated, being meanwhile subjected to the action of the hot air circulating through the box or casing 1.

Owing to the construction of the carriers the warp is throughout the greater portion of its extent free from contact with the edges of the blades, so that the hot air has free and unobstructed access to such portions of the rope or bunch. Hence the rapid drying of the warp is facilitated, while the contact of the warp with the edges of the wooden blades does not have that detrimental effect upon the appearance or quality of the warp which is due to long-continued contact of the threads with the surface of a heated metal cylinder. Hence, besides facilitating the operation of drying, my invention enables this operation to be performed more effectively than in the usual cylinder driers.

The blades may, if desired, have projecting pins at the ends, so as to separate from each other the successive runs of the rope or chain of warps and thus overcome any risk of entanglement, although in most cases these pins will not be necessary.

I am aware that it has been proposed to construct a drier having slatted drums rotating in a box or casing through which heated air is caused to circulate, but the objection to a slatted drum is the liability of loose ends of the warp catching in the slats and leading to serious entanglement and breakage of the warp-threads, an objection which is effectually overcome by the use of bladed carriers, especially when the blades are composed of solid strips or bars.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The within-described warp-carrier for warp-drying machines, said carrier consisting of a central shaft or support having blades or paddles projecting therefrom, substantially as specified.

2. The within-described warp-carrier for warp-drying machines, said carrier consisting of a central shaft or support having blades or paddles projecting therefrom, each of said blades or paddles consisting of a solid strip or bar presenting an outer edge of wood for the support of the warp, substantially as specified.

3. The combination in a warp-drying apparatus, of a casing having inlet and outlet for the heated air, with a series of warp-carriers mounted in said casing and each consisting  
5 of a central shaft or support with blades or paddles projecting therefrom, and means for rotating said carriers at uniform speed, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK TURNBULL.

Witnesses:

JOS. H. KLEIN,  
F. E. BECHTOLD.