

No. 699,118.

Patented Apr. 29, 1902.

E. STORCH.  
DRIER.

(Application filed Apr. 17, 1901.)

(No Model.)

3 Sheets—Sheet 1.

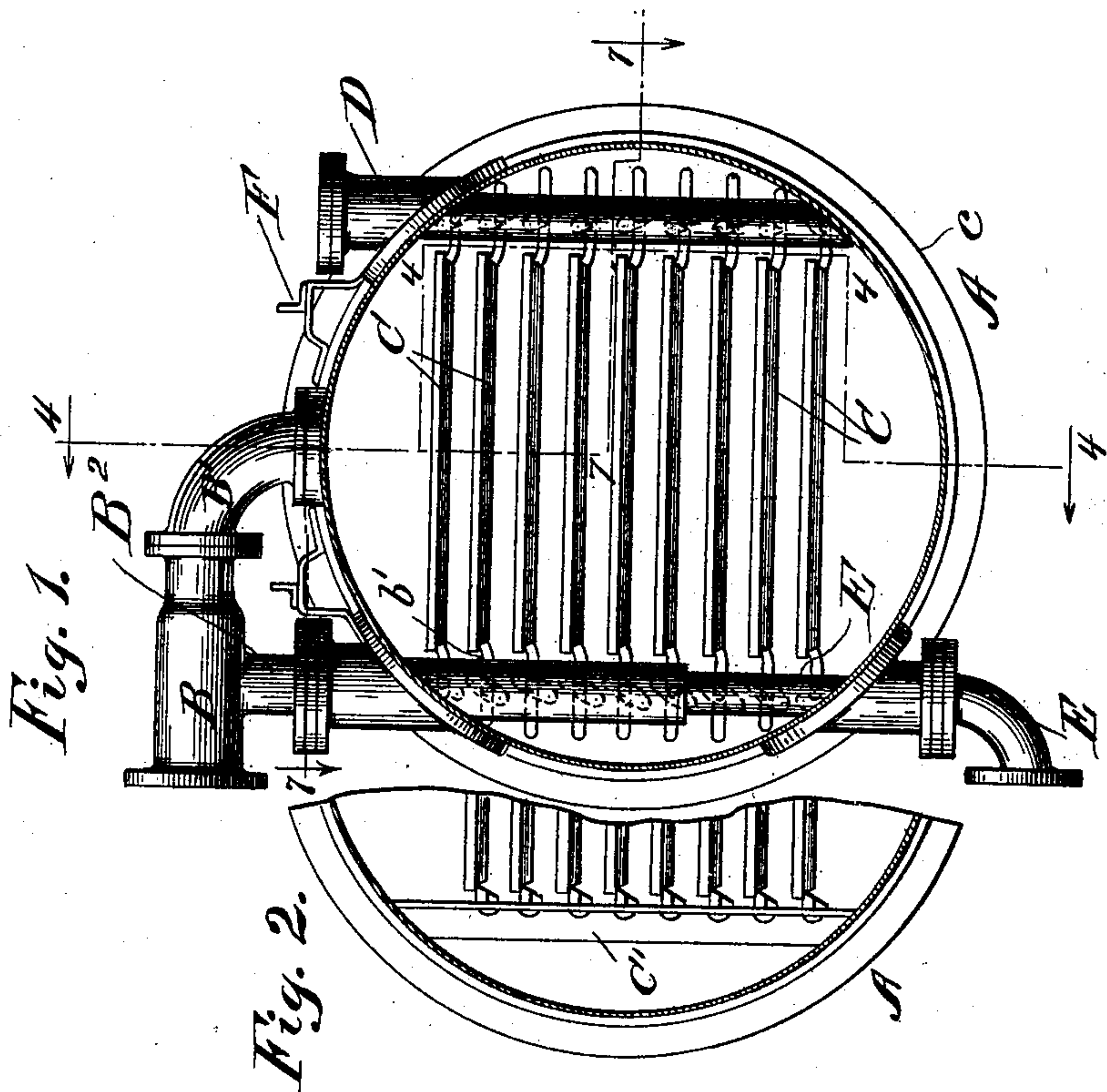
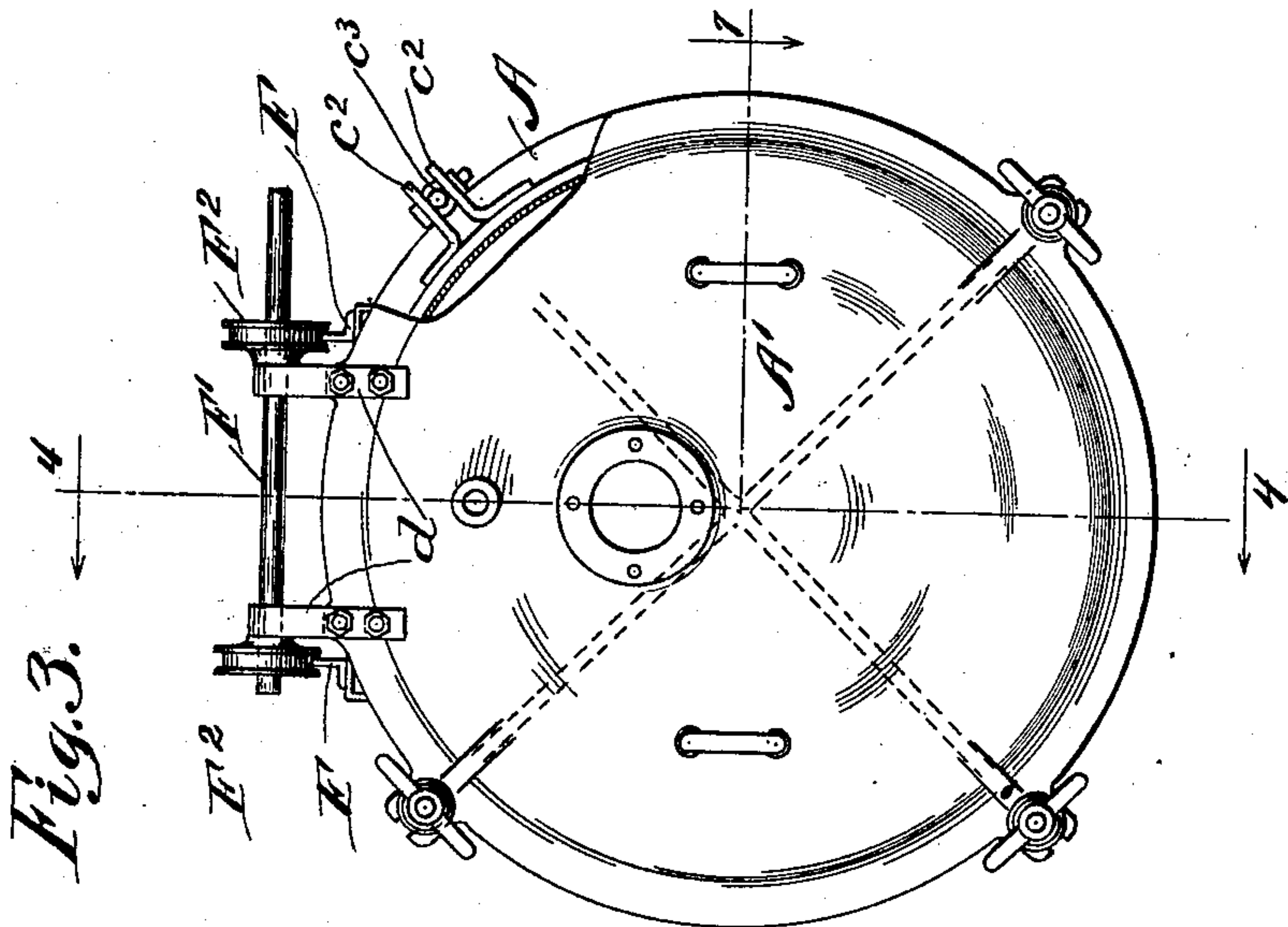


Fig. 2.

Witnesses:  
D. H. Lee.  
A. D. Bacci.

Inventor:  
Ernst Storch  
By *[Signature]* Atty's

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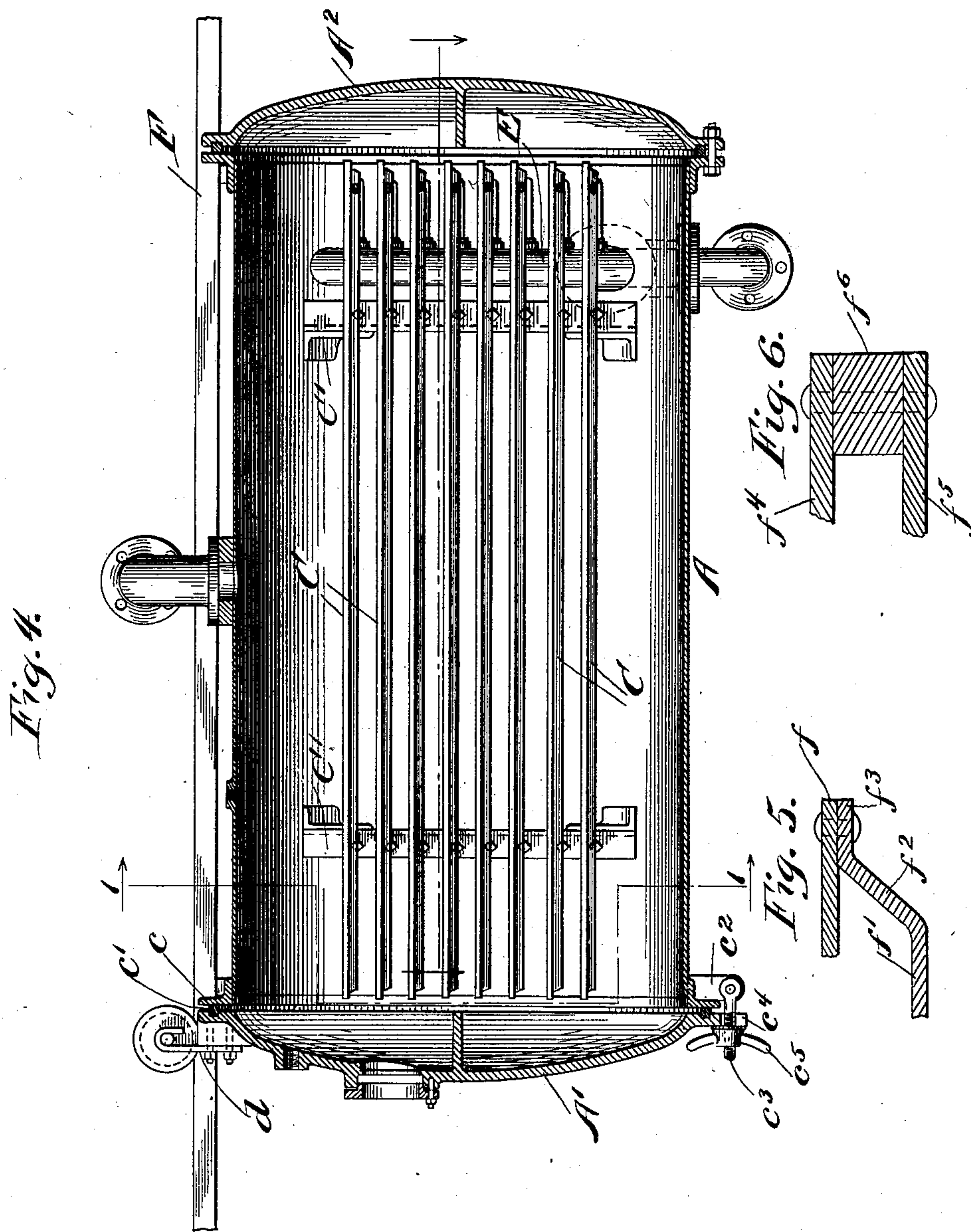
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**3 Sheets—Sheet 2.**



*Witnesses:*  
D. H. Lee.  
A. D. Bacci.

Inventor:  
Ernst Storch  
By *Gyromfied Gyromfied & Lee*  
Attys



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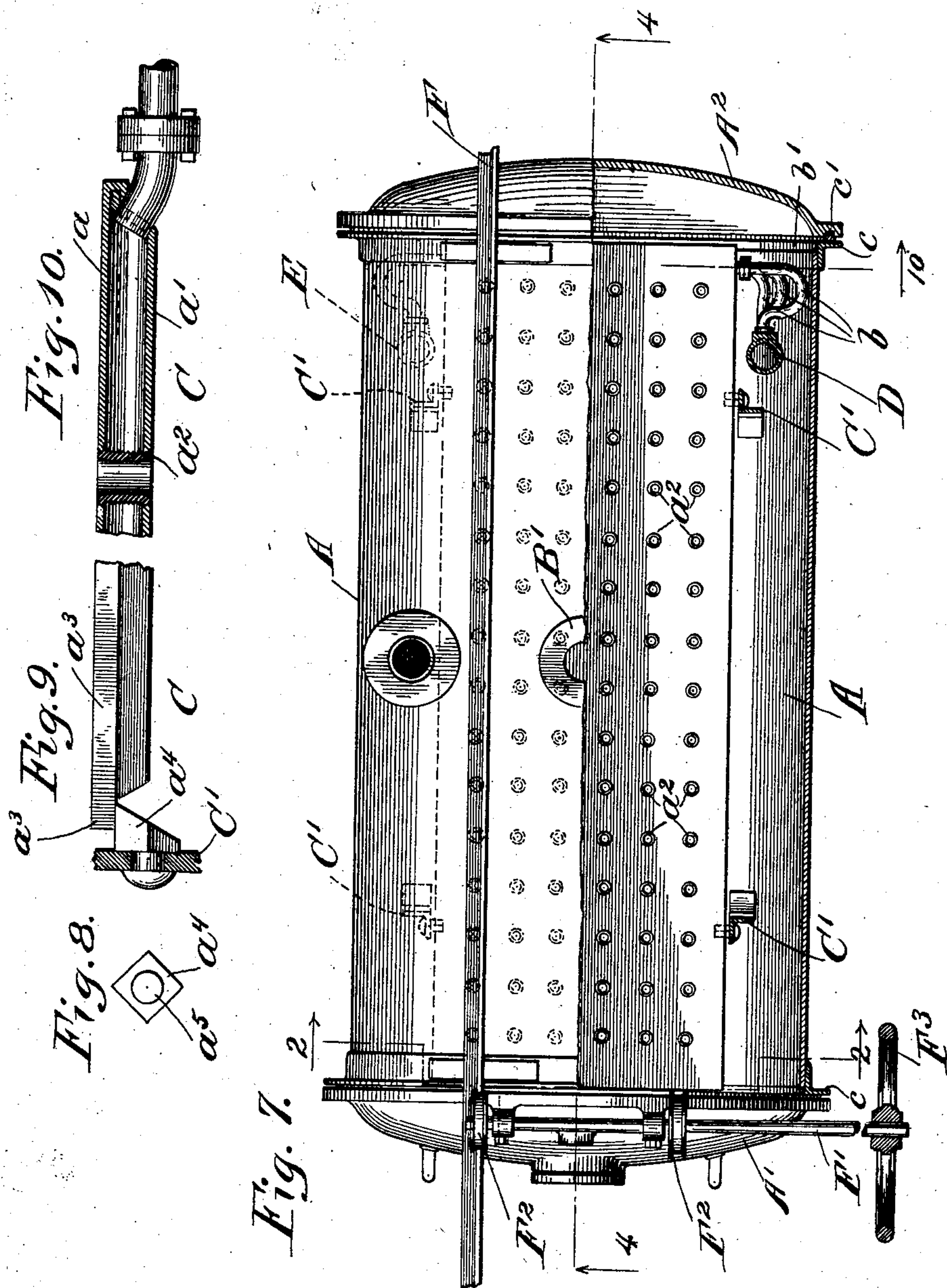
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3 Sheets—Sheet 3.



Witnesses:

J. H. Lee.

A. D. Bacon

Inventor:  
Ernst Storch

By *Dyrenforth Dyrenforth & Co.*  
Attys



# UNITED STATES PATENT OFFICE.

ERNST STORCH, OF BERLIN, GERMANY, ASSIGNOR TO CARL BINDER, OF CHICAGO, ILLINOIS.

## DRIER.

SPECIFICATION forming part of Letters Patent No. 699,118, dated April 29, 1902.

Application filed April 17, 1901. Serial No. 56,273. (No model.)

*To all whom it may concern:*

Be it known that I, ERNST STORCH, a subject of the Emperor of Germany, residing at Berlin, Germany, have invented a new and useful Improvement in Driers, of which the following is a specification.

My invention relates particularly to driers for use in drying sheet material, such as sheet-rubber, though the invention may be usefully applied to other purposes.

My object is to provide a drier of generally improved construction, particular attention being paid to securing a large amount of heating-surface.

In the accompanying drawings the invention is shown in connection with a vacuum-drier; but it will be readily understood that it is not limited thereto.

In the drawings, Figure 1 is a transverse vertical section taken as indicated at line 1 of Fig. 4; Fig. 2, a broken transverse section taken as indicated at line 2 of Fig. 7; Fig. 3, a broken end elevational view; Fig. 4, a longitudinal vertical section taken as indicated at line 4 of Figs. 1, 3, and 7; Figs. 5 and 6, details of modifications of drying or heating shelves employed; Fig. 7, a view partly in plan and partly in section and taken as indicated at line 7 of Fig. 1; Fig. 8, a view of the device employed for supporting the heating-shelves; Fig. 9, a broken sectional view illustrating the manner in which the heating-shelf is supported; and Fig. 10, a broken transverse vertical section of a heating-shelf, the section being taken as indicated at line 10 of Fig. 7.

In the preferred construction there is employed a large cylinder in which is maintained a vacuum or a partial vacuum, superimposed heating-shelves, pipes for conducting the heating fluid to and away from said shelves, and a pipe for exhausting the large drying-cylinder. The general construction of the drying-cylinder herein shown and of the means for maintaining a vacuum therein is now well known in the art, and the description of the same will therefore be only detailed enough to enable an adequate description of the improvements.

A represents a drying-cylinder having ends A' A<sup>2</sup>; B, a centrally-located vapor and air

exhaust pipe having branch pipes B' B<sup>2</sup>; C, rectangular hollow heating-shelves contained within the said cylinder and supported from upright angle-irons C'; D, a vertically-disposed heating-fluid-supply pipe which extends into the cylinder and projects through a cylindrical wall thereof; E, an exhaust-pipe for the heating-shelves C; F, longitudinally-extending track-rails located above the cylinder and projecting beyond the ends thereof, and F' a shaft provided with rigidly-secured wheels F<sup>2</sup>, traversing said track-rails, said shaft being provided with a hand-wheel F<sup>3</sup> and serving to support the cylinder end or door A'.

The manner in which the exhaust-pipe B is connected through its branches with the drying-cylinder and the purpose of said two branch pipes are now known in the art.

Each heating-shelf C comprises, Fig. 10, an upper sheet-metal plate *a* and a lower sheet-metal plate *a'*, said plates being suitably joined at their edges and a desired space being preserved to form a hollow heating-shelf for receiving the heating fluid. By preference the plates are joined at intervals by tubes or stays *a*<sup>2</sup>, which extend therethrough and have threaded connection therewith, the ends of the tubes being expanded to form steam-tight joints. By making the connections between the plates *a a'* at comparatively close intervals the plates are prevented from bulging and a perfectly-flat upper surface is preserved, which is an important consideration in driers for use for certain purposes.

The manner of supporting the heating-shelves is shown in Fig. 9, from which it will be observed that each heating-shelf is formed with a flange *a*<sup>3</sup>, and there are employed in connection with the angle-bars C' lugs *a*<sup>4</sup>, which project inwardly beneath the flange *a*<sup>3</sup>. By preference the lugs *a*<sup>4</sup> are formed from pieces of square cross-section disposed as illustrated in Fig. 8. In this construction each lug is provided with a round shank *a*<sup>5</sup>, which extends through a perforation in the angle-iron and is clenched on the outer side of the angle-iron. The inner end of each lug has an inclination inwardly and upwardly, and the lug is so disposed that a corner of the bar from which it is formed is presented be-



neath the flange  $a^3$ . This enables the heating-shelves to be easily adjusted to make them perfectly level, as the corner upon which the flange rests may be readily filed off. The drawings show the heating-shelf supported by four upright angle-irons and the required number of lugs projecting inwardly therefrom.

As illustrated in Fig. 1, the pipe D enters at the upper portion of the cylinder near one end of the cylinder and extends to near the lower portion of the cylinder, where it has a closed end. The exhaust-pipe E, however, enters the cylinder from the lower portion of the cylinder and extends to near the upper portion of the cylinder. The pipe D is connected with all the heating-shelves C by means of short pipe-sections  $b$ , and the pipe E is connected with all said heating-shelves by means of short pipe-sections  $b'$ . These short pipe-sections are all curved, as illustrated in Fig. 7, thereby to prevent injury to the parts from unequal expansion. The drawings show the small pipe-sections detachable; but it will be understood that any desired form of connection may be used. The curves or loops of the small pipe-sections vary in size to accommodate them to different portions of the cylinder, as illustrated in Figs. 1 and 7.

At the ends of the drying-cylinder are circumferential flanges  $c$ , preferably of the angle form shown, whereat are located gaskets  $c'$ , interposed between said flanges and the ends of the cylinder. Brackets or lugs  $c^2$  are secured to the cylinder, and bolts  $c^3$  are pivoted thereto. The cylinder ends are provided with slots  $c^4$ , which receive said bolts, and nuts  $c^5$  serve to secure the cylinder ends in place. As illustrated in Fig. 3, hangers  $d$  are attached to one of the cylinder ends and hook over the shaft or axle  $F'$ . When the cylinder end  $A'$  is loosened from its connection with the cylinder, the shaft  $F'$  may be turned through the medium of the hand-wheel  $F^3$  to move the door away from the cylinder.

Figs. 5 and 6 illustrate different manners of forming the heating-shelves C. Fig. 5 shows a flat upper plate  $f$  and a lower plate  $f'$ , having inclined portions  $f^2$  and horizontal flanges  $f^3$ . The plates are secured together at their margins either by welding, brazing, or riveting. In Fig. 6 there are shown a flat top plate  $f^4$ , a lower plate  $f^5$ , and an interposed marginal strip  $f^6$ . In the construction shown in Fig. 10 the margins of the upper plate are bent down and under a marginal

flange with which the lower member is provided, and the seam thus formed is brazed. This forms a seam which, while more expensive, perhaps, than the ordinary seam, is thoroughly reliable.

From the foregoing description it will be readily understood that the material to be dried is placed upon the heating-shelves C, which in this manner act also as shelves for the material, and heat is supplied to the heating-shelves through the pipe D. The preferred manner of heating the shelves C is by circulating steam therethrough and exhausting the same through the pipe E. Any other heating fluid may be employed, however. The tubes  $a^2$  form efficient stays for preventing bulging or bursting of the walls of the heating-shelves and also to a certain extent allow passage of vapors. It will be understood, however, that the vapors pass chiefly by the sides and ends of the combined heating heads and shelves to reach the branch pipes connected with the cylinder-exhaust pipe B.

Changes in details of construction within the spirit of my invention may be made. Hence I do not wish to be understood as limiting myself by the detailed description given above except as shall appear from the appended claims.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a drier, the combination of a drying-chamber, a plurality of hollow, superimposed heating-shelves within said chamber, separately-formed vertical supply and exhaust pipes extending into the interior of said chamber and without communication with the interior thereof, means of communication between said pipes and said shelves and contained wholly within said chamber, and standards supporting said shelves, substantially as and for the purpose set forth.

2. In a drier, the combination of a horizontally-disposed drying-cylinder, a plurality of horizontally-disposed heating-shelves, separately-formed vertical supply and exhaust pipes passing into the interior of said cylinder and having no communication with the interior of said cylinder, and interiorly-located pipes connecting said shelves with said vertical pipes, substantially as described.

ERNST STORCH.

In presence of—

WOLDEMAR HAUPT,  
HENRY HASPER.