

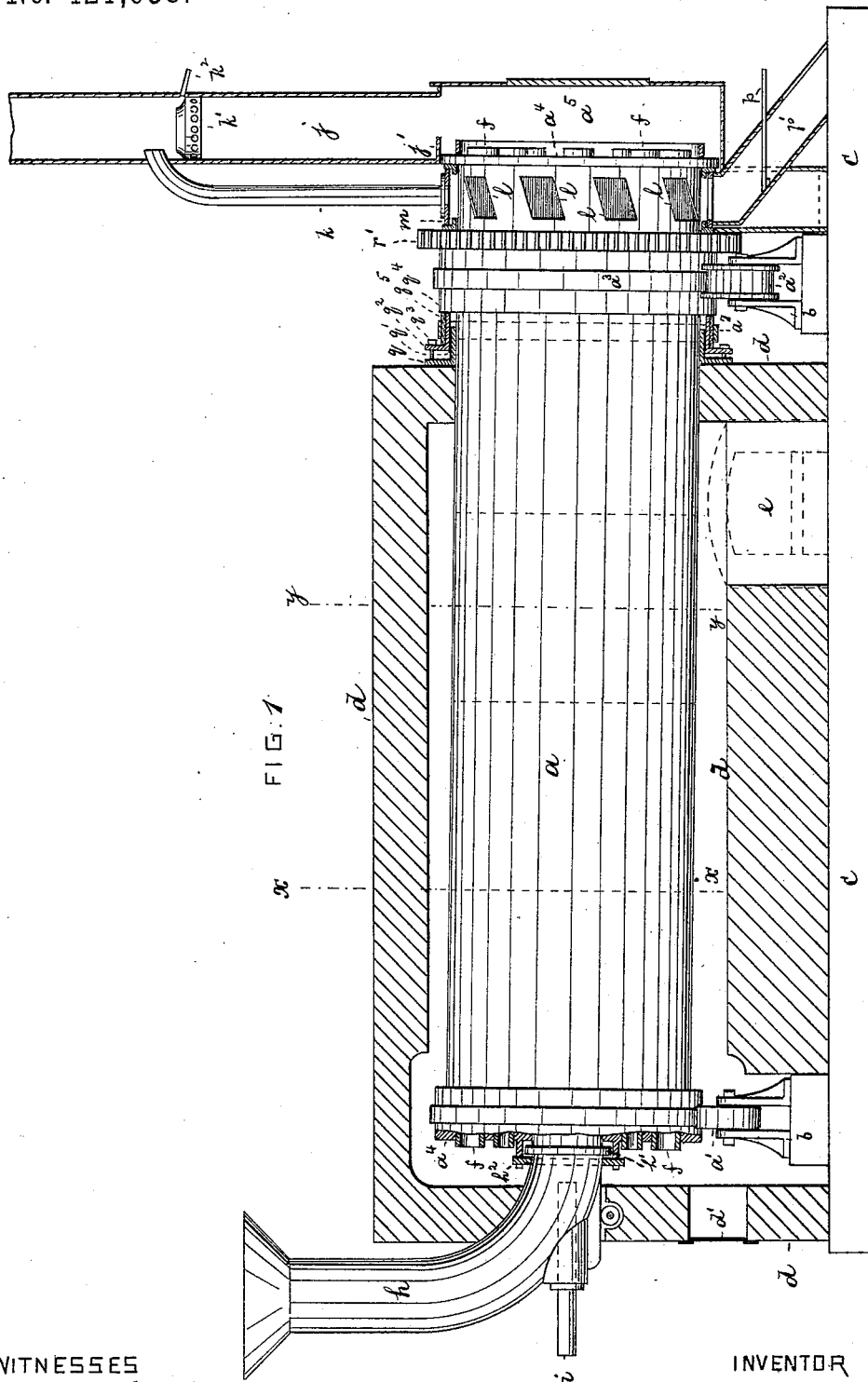
(No Model.)

2 Sheets—Sheet 1.

C. SENTZ.  
DRYING APPARATUS.

No. 421,058.

Patented Feb. 11, 1890.



WITNESSES

W. A. Lowe  
A. Sponglians.

INVENTOR

C. Lentz  
by his attorneys  
Roeder & Briesau

(No Model.)

2 Sheets—Sheet 2.

C. SENTZ.  
DRYING APPARATUS.

No. 421,058.

Patented Feb. 11, 1890.

FIG. 2

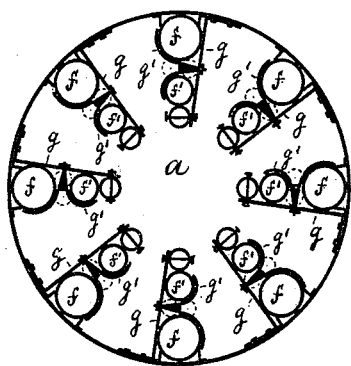
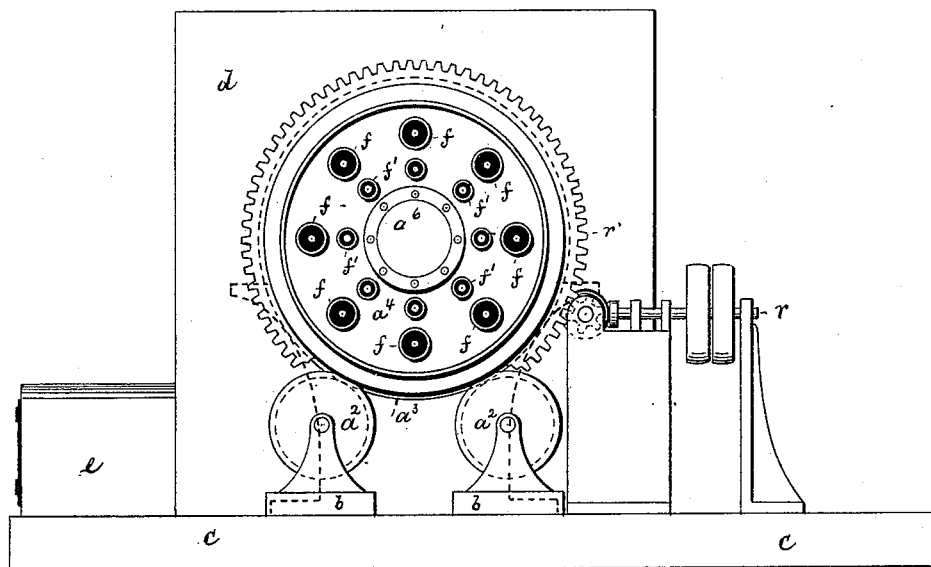


FIG. 3

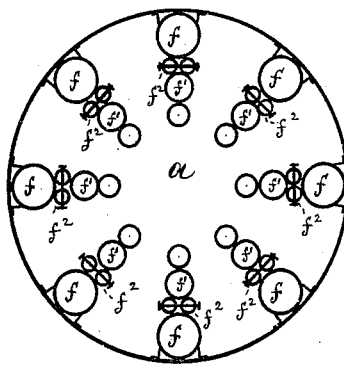


FIG. 4

WITNESSES

*W. A. Howe*  
*Houghman*

INVENTOR.

*C. Sentz*  
*by his attorneys*  
*Roeder & Priesner*

# UNITED STATES PATENT OFFICE.

CARL SENTZ, OF BROOKLYN, NEW YORK.

## DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 421,058, dated February 11, 1890.

Application filed July 26, 1889. Serial No. 313,768. (No model.)

*To all whom it may concern:*

Be it known that I, CARL SENTZ, of Brooklyn, New York, have invented an Improved Drying Apparatus, of which the following is  
5 a specification.

This invention relates to an apparatus for drying the waste from breweries, and also for drying fruit and other matter.

It consists in the various features of improvement more fully pointed out in the  
10 claims.

In the accompanying drawings, Figure 1 is a sectional elevation of my improved drying apparatus. Fig. 2 is an end view of Fig. 1; Fig. 3, a section on line *x x*, Fig. 1; and Fig.  
15 4, a section on line *y y*, Fig. 1.

The letter *a* represents a drum slightly inclined and resting upon the rollers *a'* at one end and the rollers *a''* at the other end.  
20 The rollers *a''* are flanged and engage a flange *a'''* on drum *a*, while the rollers *a'* are without flanges. Thus it will be seen that the drum is free to expand and contract under the influence of heat without slipping from the  
25 rollers. The bearings *b* of rollers *a'* *a''* are mounted upon a bed-plate *c*, from which arises a chamber *d* of masonry that surrounds the drum at its sides and also at one end, while the other end (right-hand end) projects out  
30 of such masonry. The chamber *d* has man-hole *d'*, and should be sufficiently large to create a heating-space around the drum, as shown. Into the chamber *d* there opens a fire-chamber *e*, that supplies hot air to the  
35 former.

The drum *a* is provided with a series of longitudinal tubes *f f'*, open at both ends and passing through the heads *a<sup>4</sup>* of the drum. Into these tubes the heat from chamber *d* enters at one end and is discharged at the other  
40 end. The tubes *f f'* are held in place and are prevented from sagging by a series of brackets *g*, riveted to the interior of the drum and provided with the double hooks *g'*, Fig. 3,  
45 that embrace the tubes.

Between tubes *f f'* small closed tubes or rods *f''* are placed, that prevent the matter to be dried from settling between tubes *f f'*.

At that end of the drum which is inclosed  
50 by chamber *d* there enters the feed-hopper *h*, having a collar *h'*, embraced by collar *h''* of drum *a*, so that the drum is free to turn. Into

hopper *h* opens a cold-air tube *i*, which admits fresh air to the interior of the drum at the same time that the matter to be dried is  
55 admitted by the hopper. At the opposite end the drum *a* enters a chamber *a<sup>5</sup>*. The tubes *f f'* project a slight distance beyond the head into this chamber, so that the smoke and heat delivered from them is not apt to strike  
60 back, but will freely enter a stack *j*, which has flange *j'* above head *a<sup>4</sup>*. The cold air admitted through tube *i* after traversing the drum is discharged by a tube *k*, entering the  
65 stack *j*. Below the upper end of tube *k* there is placed into the stack *j* a ring *k'*, which is riveted to the inner face of the stack, the rivets being indicated by the small circles upon  
70 the body of the ring shown in Fig. 1. The ring *k'* is provided with an upwardly and inwardly projecting flange that constitutes a trough. This trough collects any products of  
condensation that form on the inner surface of the stack above the ring, and carries them  
75 off through an opening *k''* in the stack, thus preventing them from reaching and affecting the drum.

Below the tube *k* the drum *a* is provided with the discharge-orifices *l*. These orifices are set at an oblique angle to the axis of  
80 the drum and have sharp points or angles, so as to readily discharge the dried material, no matter whether the drum is revolved backward or forward. The orifices *l* are surrounded by a collar *m*, open at its lower end. Here  
85 the collar communicates with a hopper *p'*, through which extends a slide *p*. The matter discharged through the orifices *l* drops through the collar upon the slide, and by withdrawing the latter such matter will be delivered  
90 into the lower part of the hopper.

Access to the interior of the drum is gained through man-hole *a<sup>6</sup>* in head *a<sup>4</sup>*.

In order to form a tight adjustable packing between the exposed end of drum *a* and the  
95 masonry *d*, I secure to the masonry a fixed angle-plate *q*, upon which is placed an asbestos ring *q'*. Over this ring is placed the angle-plate *q''*, adjustable by set-screws *q'''* against a shoulder *q<sup>4</sup>* of the drum. Around angle-  
100 plate *q''* is placed a second asbestos ring *q<sup>5</sup>*, held in place by an encircling band *a'*.

In use the drum is revolved from a suitable power-shaft *r*, intergeared with toothed wheel

$r'$ , surrounding drum  $a$ . The matter to be dried is admitted through hopper  $h$ , and fresh air is admitted through tube  $i$ . The heat and products of combustion from fire-chamber  $e$  enter chamber  $d$  and thence tubes  $f f'$ . The heat will properly dry the contents of the drum, while such contents are gradually fed toward the discharge-orifices by the slight incline of the drum.

10 In my improved drying apparatus the drum will readily turn, while being free to expand and contract. The material operated upon will be uniformly dried and untainted by smoke.

15 What I claim is—

1. The combination of drum  $a$  with an inclosing-chamber  $d$ , a fire-chamber  $e$ , connected therewith, a hopper entering one end of the drum, an air-inlet pipe entering the hopper, a chamber  $a^5$ , inclosing the opposite end of the drum, a stack communicating therewith, a series of hot-air pipes passing through the drum connecting the said fire-chamber and said chamber  $a^5$ , and an air-outlet pipe  
20 connecting the drum with such stack, substantially as specified.

2. The combination of drum  $a$ , having a series of obliquely-set discharge-orifices  $l$  near one end, with a cut-away collar  $m$  encircling  
30 the drum around said orifices, a hopper  $p'$ , communicating with the collar, a slide  $p$  within the hopper, and a series of hot-air tubes

extending through the drum, substantially as specified.

3. The combination of a drum, with two sets 35 of hot-air tubes  $f f'$  extending through the drum, brackets secured within the drum, double hooks secured to the brackets and embracing the tubes, and rods  $f^2$  between the tubes  $f f'$ , substantially as specified.

4. The combination of a drum with an inclosing-chamber  $d$ , an angle-plate  $q$ , secured to the chamber, an asbestos ring  $q'$  upon the angle-plate, an adjustable angle-plate  $q^2$ , having set-screws  $q^3$  upon ring  $q'$ , an asbestos  
45 ring  $q^5$  upon angle-plate  $q^2$ , and a band  $a'$ , encircling said ring, substantially as specified.

5. The combination of a drum, with a feed-hopper entering one end thereof, an air-inlet pipe entering the hopper, a chamber 50  $a^5$ , inclosing the opposite end of the drum, a series of hot-air pipes passing through the drum communicating with said chamber  $a^5$ , a smoke-stack entering said chamber and having opening  $k^2$ , an air-discharge pipe connecting the drum with such stack, and a  
55 flanged ring  $k'$  within the stack beneath the outlet of the air-discharge pipe, substantially as specified.

CARL SENTZ.

Witnesses:

F. V. BRIESEN,  
A. JONGHMANS.