

**No. 689,728.**

**Patented Dec. 24, 1901.**

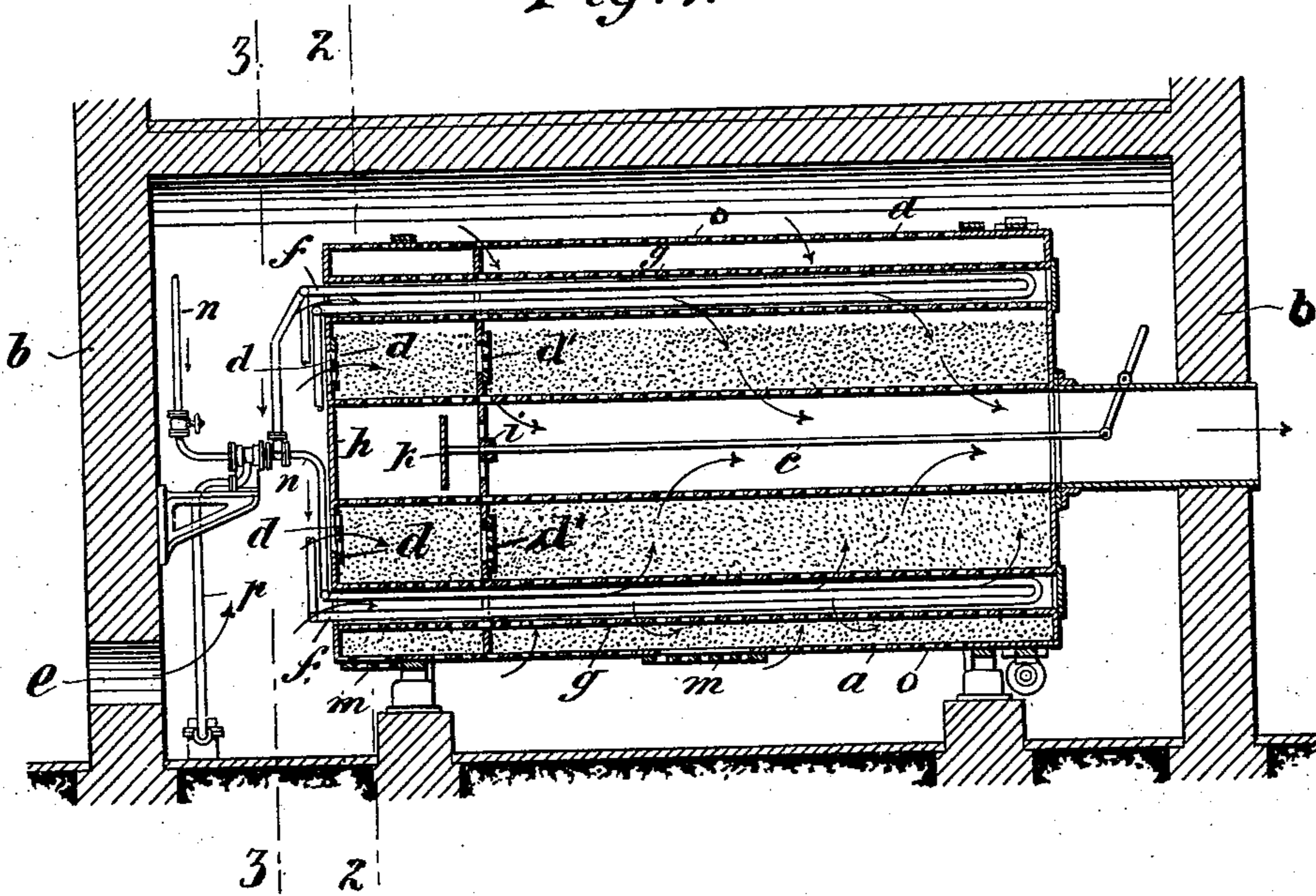
**F. KNÜTTEL.**  
**MALT DRUM.**

(Application filed Feb. 23, 1901.)

(No Model.)

**2 Sheets—Sheet 1.**

*Fig. 1.*



Witnesses -

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Inventor:—

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2 Sheets—Sheet 2.

Fig. 2.

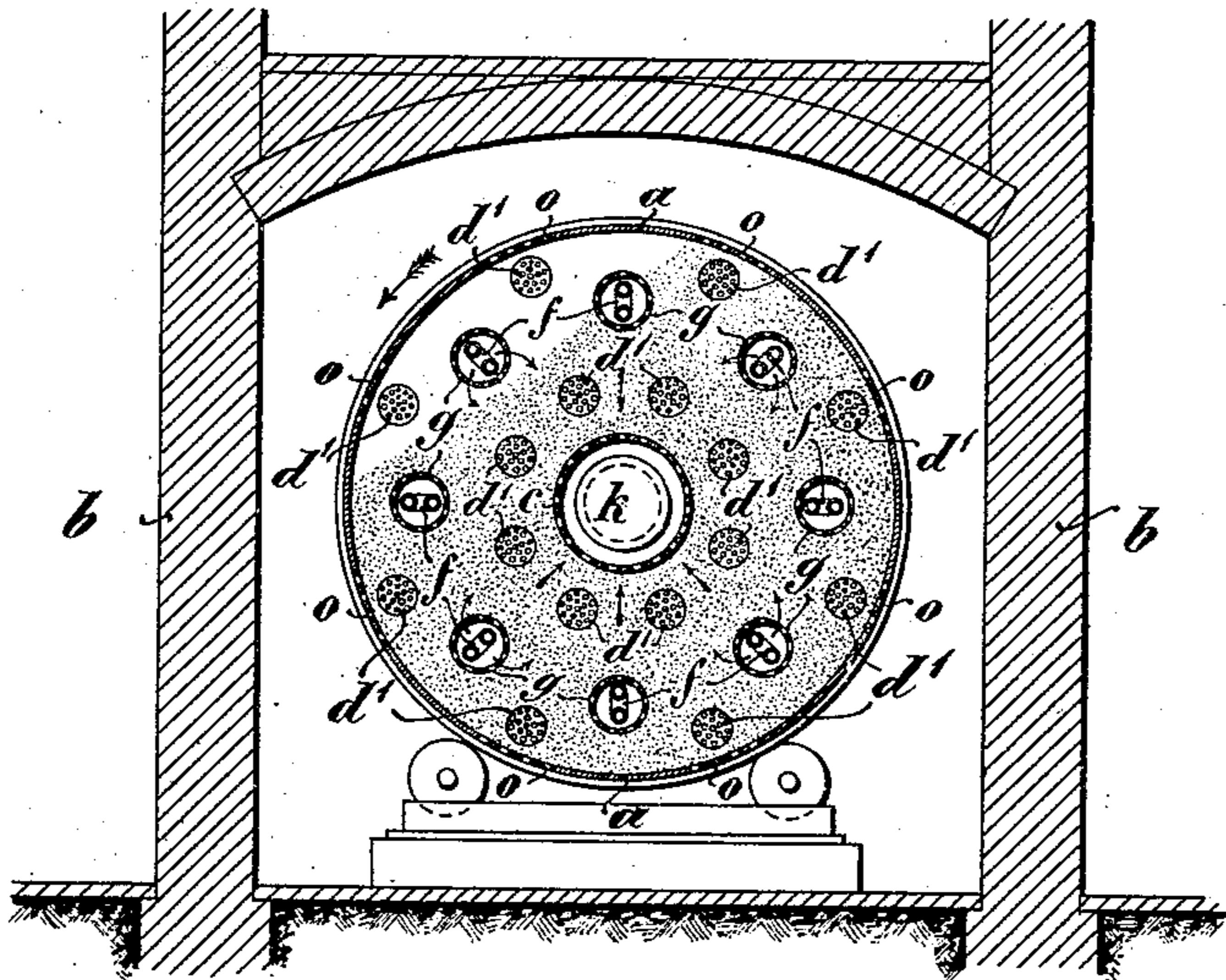


Fig. 3.

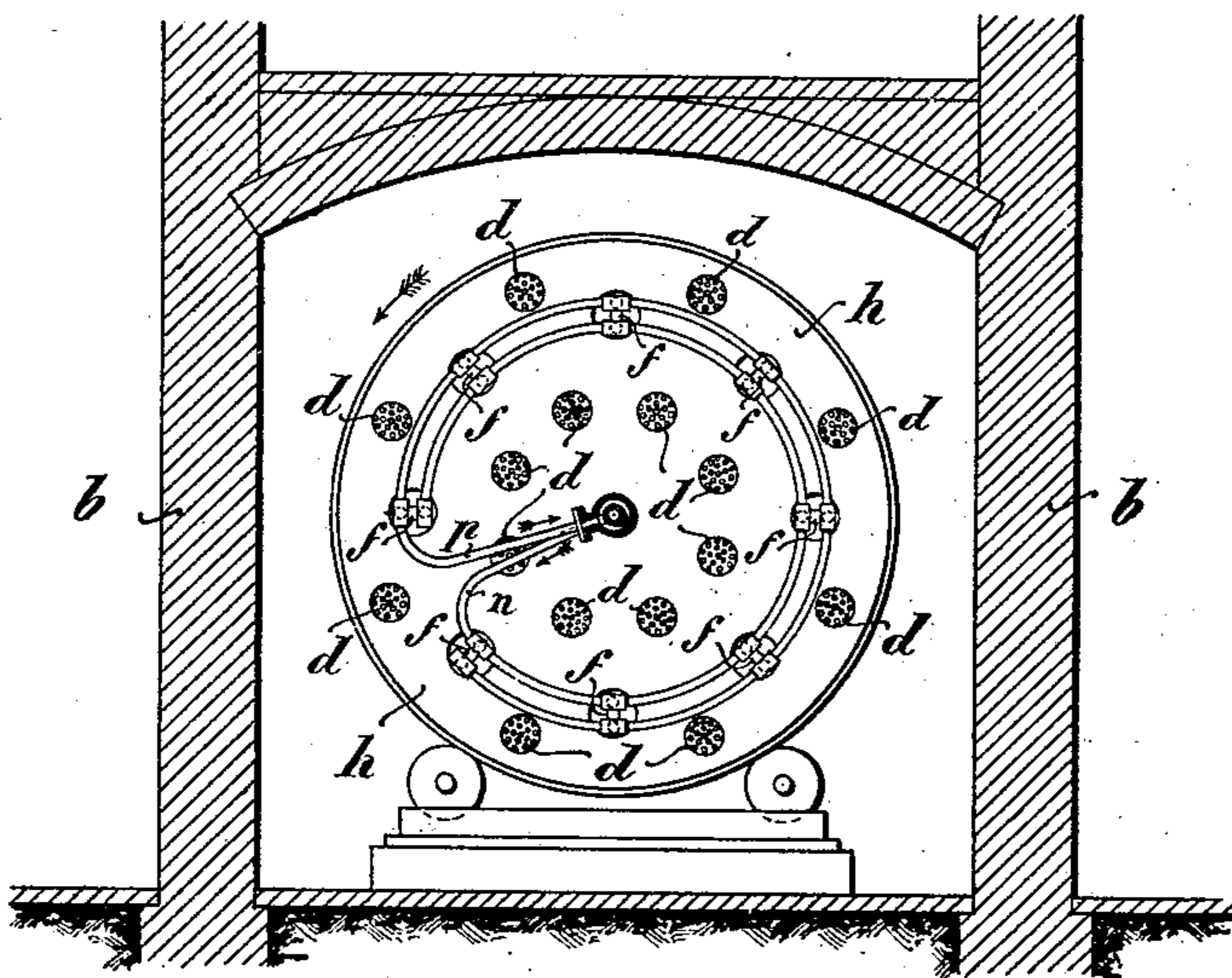


Fig. 5.



Fig. 4.



Witnesses:

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Friedrich Knüttel  
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# UNITED STATES PATENT OFFICE.

FRIEDRICH KNÜTTEL, OF CHARLOTTENBURG, GERMANY.

## MALT-DRUM.

SPECIFICATION forming part of Letters Patent No. 689,728, dated December 24, 1901.

Application filed February 23, 1901. Serial No. 48,489. (No model.)

*To all whom it may concern:*

Be it known that I, FRIEDRICH KNÜTTEL, a subject of the King of Prussia, German Emperor, and a resident of No. 6 Franklinstrasse, Charlottenburg, near Berlin, in the Kingdom of Prussia, German Empire, have invented new and useful Improvements in Malt-Drums; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

The process of curing raw malt is usually carried out in two drums. It may, however, be carried out by apparatus constructed in accordance with my Patent No. 643,965, in which I make use of a single drum divided into two compartments. If, however, the entire operation is to be performed in a single drum, this drum requires to be divided longitudinally into a number of compartments by partitions, which compartments are filled with raw malt, and after the volume has become sufficiently reduced one of these compartments is emptied and its contents is made use of for filling up the other compartments.

The present invention consists, with a view of accelerating the process of drying malt, in providing the shell of the drum in the spaces between the ventilating-pipes with perforations, whereby the cross-sections for the inlets of air are considerably enlarged.

The improvement is particularly designed for the drying-drum set forth in my said Patent No. 643,965 for improvements in malt-drums. A malt-drum constructed in accordance with my present improvement will permit of carrying through the curing process in the same period with a larger quantity of air heated to a lower degree than would be possible with the drum subject-matter of my Patent No. 643,965.

The accompanying drawings illustrate an improved drum of the kind specified above. Figure 1 represents a longitudinal section thereof; and Figs. 2 and 3 represent cross-sections of the apparatus on lines 2 2 and 3 3, respectively, of Fig. 1. Fig. 4 shows, on a larger scale, the perforations in the shell. Fig. 5 represents a sectional view of one of the perforated plates covering one of the holes in the partition.

Similar letters of reference indicate corresponding parts in the several figures of the drawings.

The construction of the drum itself is, generally speaking, not novel and is the same as indicated in my Patent No. 643,965—that is, it consists of a slowly-revolving closed shell or drum *a*, which is mounted in a closed heated kiln *b* and for aerating purposes is provided with a perforated central tube *c*, closed at one end, and a number of outer perforated tubes *g* in proximity to the periphery of the drum, which are open at the end where the pipes enter and are closed at the other end. The ventilating heated air is introduced into the kiln through inlet *e* and enters the outer tubes *g*, passes through the perforations of the said outer tubes into the grain with which the drum is charged, and finds its exit through the central tube *c*, influenced by an exhaust. (Not shown.) The outer tubes *g* are provided with heaters *f* for the circulation of a heating medium—such as steam, air, or a liquid—in order to enable special qualities of malt to be produced.

In order to insure regularity in the heating and ventilating of the malt in the corners near the head *h* of the drum *a*, holes covered by perforated plates *d* are provided, as shown in Figs. 1 and 3.

If the entire process is to be carried out in one drum, it is necessary to divide the same into two or more compartments. This is done by partitions, such as *i*, as shown in the drawings, which partitions are, like the head-plate of the drum, provided with holes covered by perforated plates *d'*, as shown in Figs. 1, 2, 4, and 5. In connection with said compartments valves *k* are provided for regulating the ventilating air-current. The heaters *f* are connected to each other at the front end of the drum in such manner that the heating medium enters by pipe *n*, passes through the heaters *f*, and finds its exit through pipe *p*. *m m* are manholes provided with covers serving for charging and emptying the drum or the compartments of the same.

With a view to materially assisting the drying and curing process the shell or drum is, according to the present invention, provided with perforations *o*, which are formed in the shell opposite the spaces between the aerat-

ing-pipes *g*, said perforations increasing the possibility of access of air to the grain, and thereby considerably accelerating the process, as has been ascertained by experiments.

- 5 In operation both compartments are filled with grain. The valve *k* is placed in position. (Shown in Fig. 1.) An exhaust (not shown) is applied to the end of the tube *c*. The air entering through inlet *e* passes through the per-  
10 forations in the outer shell and also through the perforations in the ventilating-tubes *g* and passes off through the pipe *c* under the influence of the exhaust (not shown) attached thereto. When the bulk of grain is reduced  
15 as described in my Patent No. 643,965, the grain in the left-hand compartment is transferred to the right-hand compartment and the valve *k* is retracted, so as to cover the perforations in that part of the partition  
20 traversing the central tube *c*. An exhaust (not shown) is again applied, and the air is drawn through the body of the malt and the

various perforations provided by this improvement in the outer shell before having access to the outer air.

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What I claim is—

A revolving drum for malting and drying grain comprising an outer shell, a central perforated tube closed at one end of the drum, perforated ventilating-tubes arranged near the  
30 periphery of the shell and closed at the opposite end of the drum, the outer shell being provided with perforations in the spaces between the ventilating-tubes, a closed chamber, and means for supplying the same with  
35 hot and moist air, substantially as and for the purposes herein set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRIEDRICH KNÜTTEL.

Witnesses:

WOLDEMAR HAUPT,  
HENRY HASPER.