

No. 685,287.

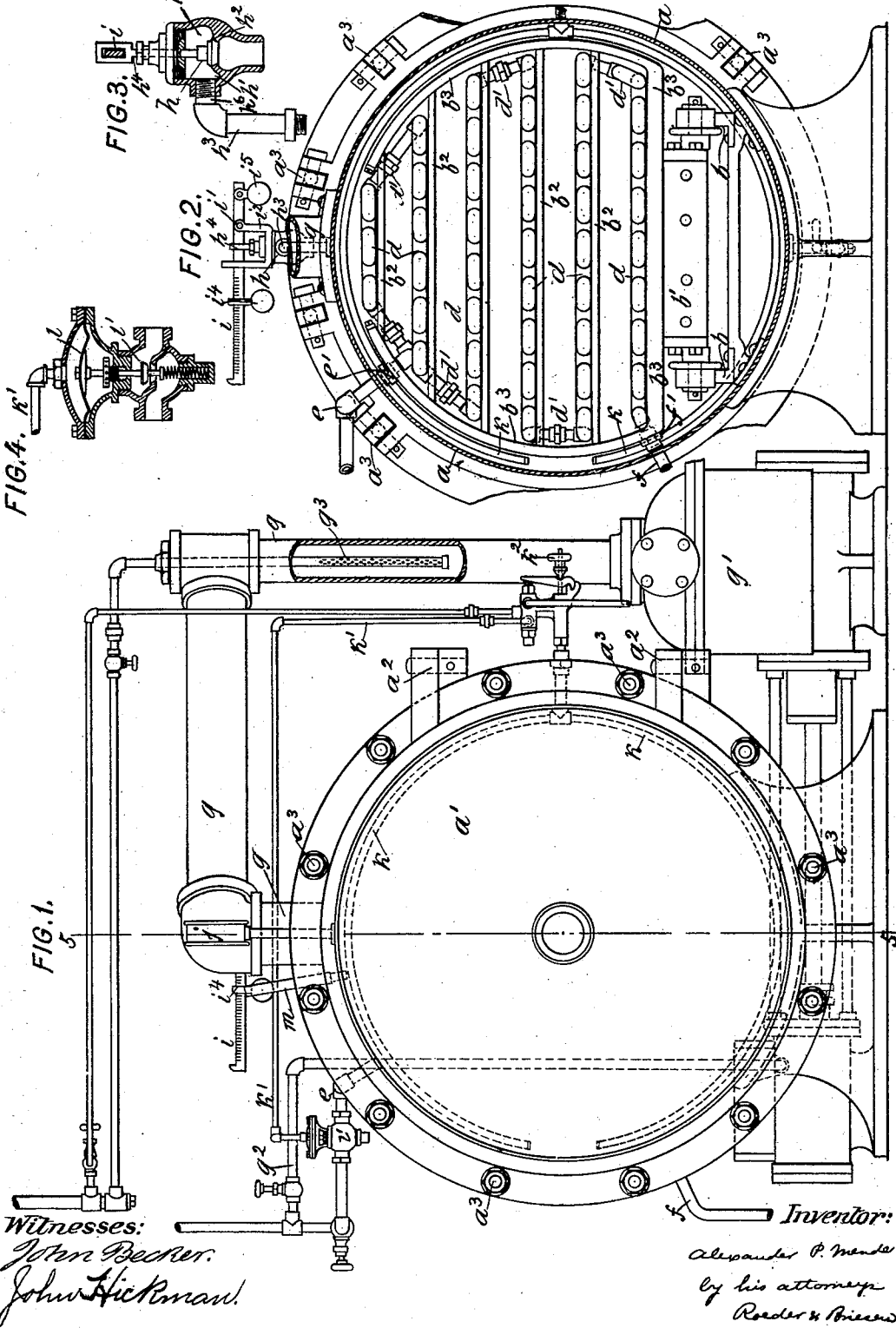
Patented Oct. 29, 1901.

A. P. MENDE.
DRYING APPARATUS.

(Application filed Oct. 15, 1900.)

2 Sheets—Sheet 1.

(No Model.)



Witnesses:
John Becker.
John Hickman.

Inventor:
Alexander P. Mende
by his attorney
Reeder & Priebe

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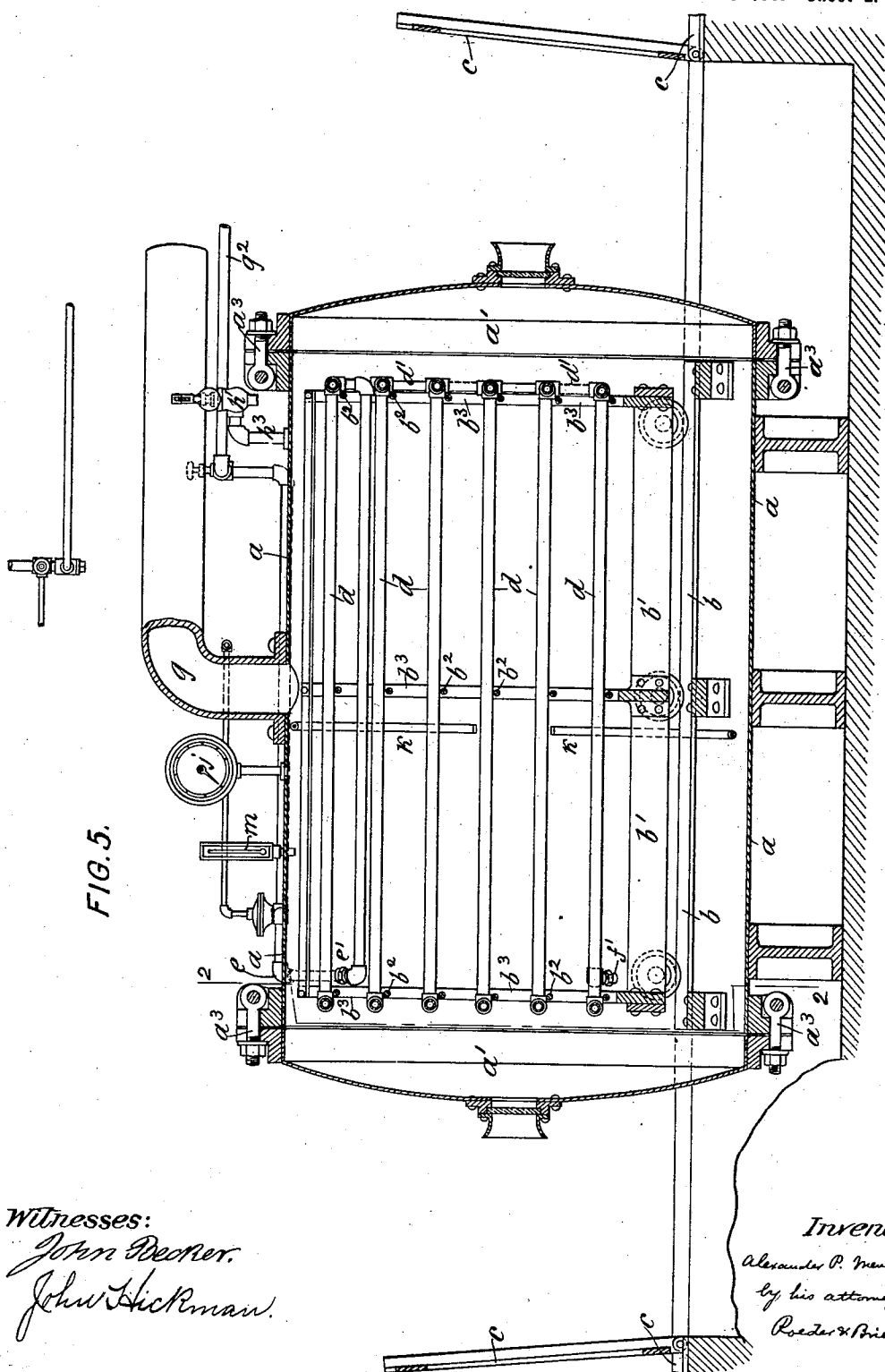
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2 Sheets—Sheet 2.



Witnesses:
John Decker.
John Hickman.

Inventor:
Alexander P. Mende
by his attorneys
Rooder & Price.

UNITED STATES PATENT OFFICE.

ALEXANDER P. MENDE, OF NEW YORK, N. Y.

DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 685,287, dated October 29, 1901.

Application filed October 15, 1900. Serial No. 33,079. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER P. MENDE, a citizen of the United States, and a resident of New York city, county and State of New York, have invented certain new and useful Improvements in Drying Apparatus, of which the following is a specification.

This invention relates to a drying apparatus of the class known as "vacuum-driers" and in which the drying operation is greatly accelerated by creating a vacuum within the drying-chamber.

The invention consists principally in so constructing the apparatus that a uniform vacuum and a constant temperature will be automatically maintained while the drying operation goes on, so that for the same setting of the apparatus an evenly-dried product will result.

The invention also consists in the various features of construction fully pointed out in the claim.

In the accompanying drawings, Figure 1 is an end elevation, partly in section, of my improved drying apparatus; Fig. 2, a vertical cross-section on line 2 2, Fig. 5; Fig. 3, a detail section of the vacuum-regulating valve; Fig. 4, a similar section through the steam-inlet valve; and Fig. 5 a longitudinal section on line 5 5, Fig. 1.

The letter *a* represents the shell of the drier, made of cylindrical or other form and open, preferably at both ends. These ends are adapted to be closed by heads or doors *a'*, hinged at *a²* and tightened up by the swinging bolts *a³*. Within the shell *a* is contained a track *b*, placed in alinement with tracks *c*, arranged outside of the shell and which may be swung up, Fig. 5, to clear the doors *a'* when the latter are to be opened. The track *b* supports a truck *b'*, that in turn supports the drying-shelves. These shelves consist of coils *d*, arranged in horizontal tiers and connected by couplings *d'* to form a continuous pipe. Each tier is supported by transverse rods *b²*, connected to a frame *b³*, that is mounted upon the truck *b'*. The steam or other heating medium is admitted to the uppermost coil *d* by inlet-pipe *e* and leaves the lowermost coil by outlet-pipe *f*, the pipes *e f* being adapted to be removably coupled to the coils *d* by the couplings *e' f'*. These coup-

lings are opened when the truck is to be withdrawn for removing and replacing the material under treatment and are closed when the truck has been rolled back into the shell.

The shelves *d* should be open, so that the drying-spaces between the shelves communicate with one another.

While the material is subjected to the action of the heat the air within the shell *a* is simultaneously exhausted to accelerate the drying operation on principles well understood in vacuum-driers. This air and the vapors or gases generated are carried off by a pipe *g*, connected to an air-pump *g'*, the latter receiving its steam-supply by pipe *g²*. Within the pipe *g* is arranged a sprinkler *g³* for precipitating the vapors.

With different materials under treatment it is of importance that the degree of air rarefaction within the shell *a* should be different. It is also of importance that any partial vacuum to which the drier has been set should be automatically maintained, so that the material under treatment and subsequent charges of similar material will be subjected to a uniform action.

The means for automatically maintaining any vacuum desired and for permitting a ready adjustment of such vacuum consists of a vacuum-valve. (More fully illustrated in Fig. 3.) The valve-casing *h* is mounted upon the top of the shell *a* and is provided above the valve-seat *h²* with a suction-chamber *h⁵*. This suction-chamber is provided with a nipple *h⁶*, that receives one end of an elbow-pipe *h³*, the other end of which enters the shell *a*. The pipe *h³* serves the double purpose of securing the valve-casing to the exterior of the shell and also for establishing communication between the interior of the shell and the suction-chamber *h⁵*. The valve-stem *h⁴* is connected to a beam *i*, turning at *i'* on frame *i²* and provided with a sliding counterbalancing-weight *i⁴* on one of its arms and with a fixed weight *i³* on its other arm. In use the vacuum within the shell *a* is ascertained by a gage *j*, and the weight *i⁴* is adjusted along its beam until the proper vacuum is indicated. This vacuum will now be automatically maintained, because when the pump *g'* exhausts an excessive amount of air the valve *h* will lift against the weight *i⁴* to admit sufficient

air to reestablish the proper vacuum. When the weight w^4 is so set as to counterbalance weight w^3 , practically no vacuum will be formed within the shell. It will thus be seen that any vacuum to which the apparatus is set is automatically maintained. It is also of importance that the temperature to which the material is subjected, and which is ascertained by thermometer m , is automatically maintained at a uniform degree. This is accomplished by a thermostat of the usual or suitable construction and which it is not deemed necessary to describe in detail.

The tube k of the thermostat containing the water or other expansible medium is so arranged within the shell a as to clear the truck and shelves. This medium acts by pipe k' upon the diaphragm l , Fig. 4, that automatically regulates the position of the valve U , through which the steam is admitted from pipe e into the coil d . The pressure within the thermostat, and the consequent degree of heat within the drier, is regulated, as usual, by the hand-wheel k^2 .

The operation of my improved drier will be readily understood. The vacuum-valve and thermostat are set to produce the partial vacuum and temperature desired for the particular goods under treatment. The truck b' is then withdrawn, the goods placed directly or in trays upon the coils d , the truck is reintroduced, and the doors are closed. As the drying-spaces between the shelves communicate with each other, the air and vapors will be evenly and simultaneously withdrawn

from all such spaces, and the degree of air rarefaction controlled by the vacuum-valve will also be uniform. Thus it will be seen that the material is subjected to a uniform treatment and that without constant watching an evenly-dried product will be obtained. This uniform treatment is also insured for charges of a like material subsequently introduced, while when a different material is to be dried the vacuum-valve and thermostat are reset to correspond to the new conditions desired.

What I claim is—

In a drying apparatus, the combination of a drying-shell with a pump for exhausting the air and vapors therefrom, a valve-casing mounted upon the shell and having a valve-seat and a suction-chamber above said seat, a pipe h^3 for securing the valve-casing to the exterior of the shell and establishing communication between the interior of the shell and the suction-chamber, an air-inlet valve opening within the suction-chamber and provided with a valve-stem, a pivoted beam engaged by the valve-stem, a sliding weight on one of the beam-arms, and a second weight on the other beam-arm, substantially as specified.

Signed by me at New York city, county and State of New York, this 12th day of October, 1900.

ALEXANDER P. MENDE.

Witnesses:

JOHN HICKMAN,
F. V. BRIESEN.