

No. 822,953.

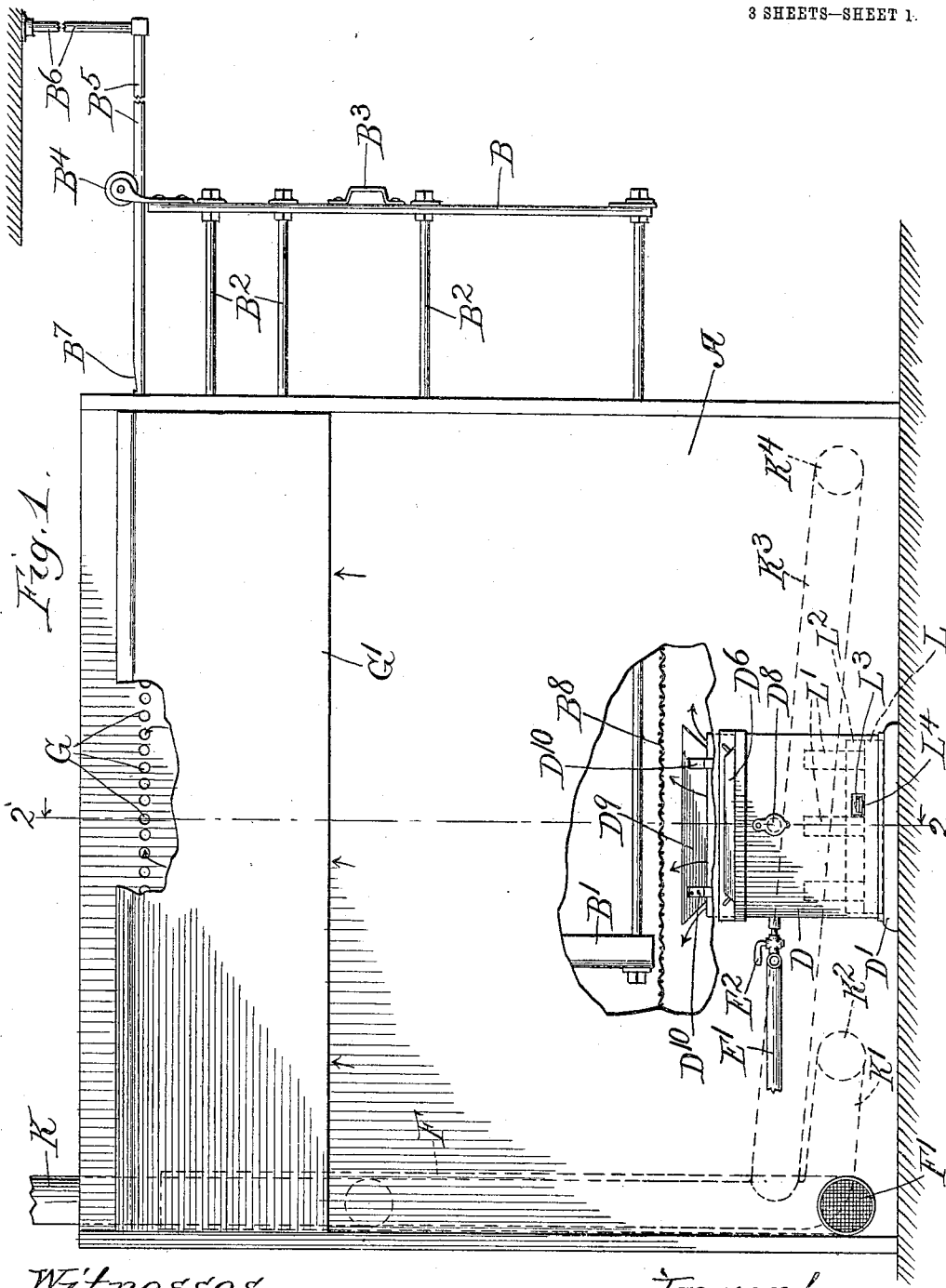
PATENTED JUNE 12, 1906.

F. T. JOHNSON.

DRIER.

APPLICATION FILED AUG. 28, 1905.

3 SHEETS—SHEET 1.



Witnesses.
Edward T. Wray.
Howard L. Kropa.

Inventor.
Francis T. Johnson.
by Parker & Carter
Attorneys.

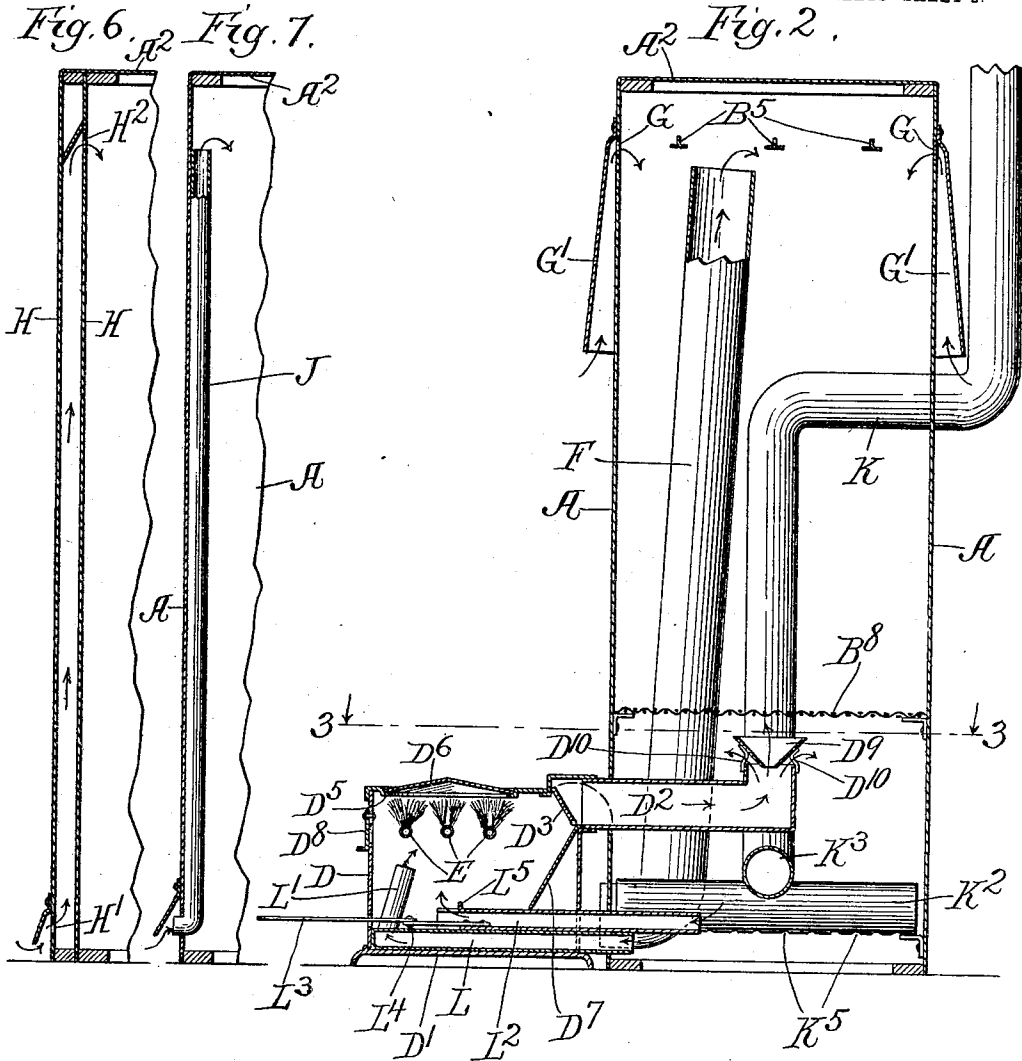
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3 SHEETS—SHEET 2.



Witnesses,
Edward T. May,
Arthur L. Croft.

Inventor,
Francis T. Johnson
by Parker & Carter
Attorneys.

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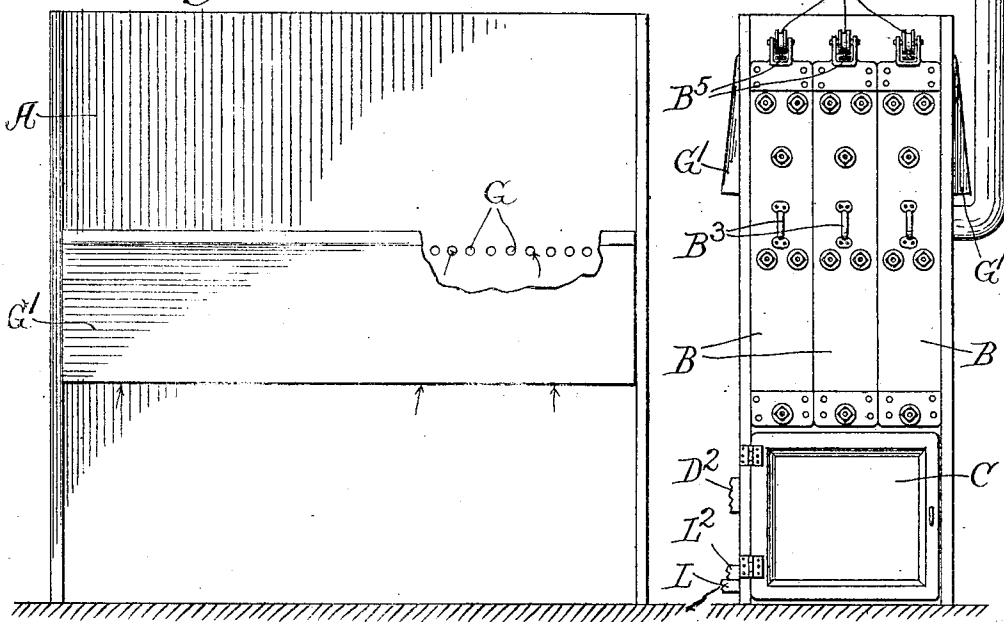
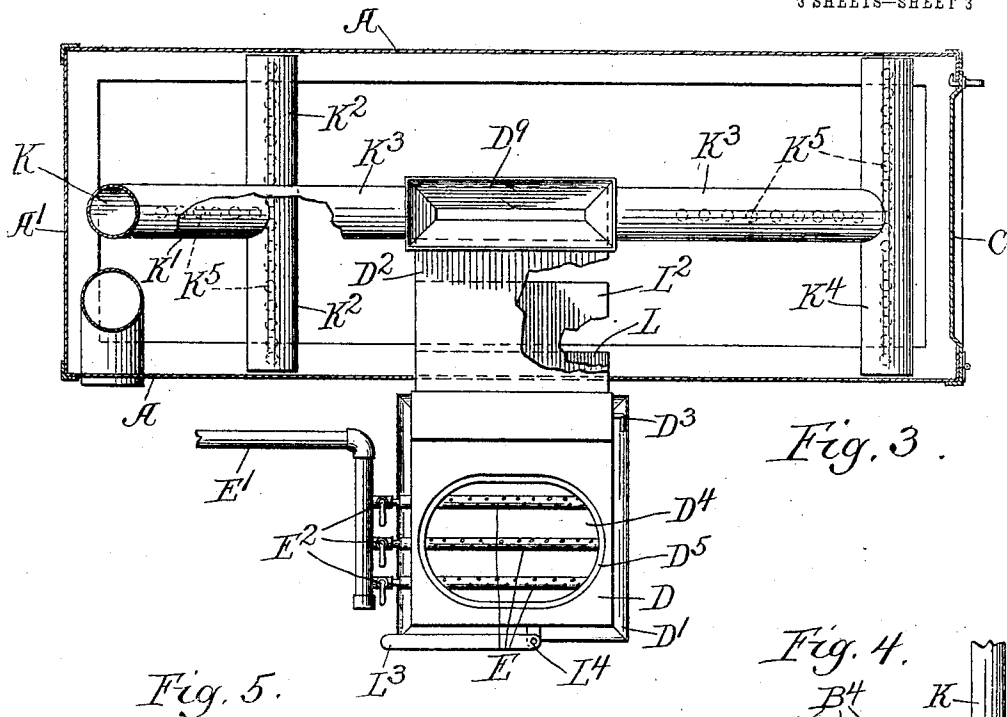
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APPLICATION FILED AUG. 28, 1905.

3 SHEETS—SHEET 3



Witnesses.

Edward T. Wray;
Homer L. Craft

Inventor,

Francis T. Johnson
by Parker Carter
Attorneys;

UNITED STATES PATENT OFFICE.

FRANCIS T. JOHNSON, OF CHICAGO, ILLINOIS.

DRIER.

No. 822,953.

Specification of Letters Patent.

Patented June 12, 1906.

Application filed August 28, 1905. Serial No. 275,995.

To all whom it may concern:

Be it known that I, FRANCIS T. JOHNSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Driers, of which the following is a specification.

My invention relates to driers, and has for its object to provide new and improved constructions in devices of that class.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation with parts broken away; Fig. 2, a vertical sectional view on line 2 2 of Fig. 1; Fig. 3, a sectional plan on line 3 3 of Fig. 2; Fig. 4, a front elevation with parts shown in section; Fig. 5, a side elevation of a modification; Fig. 6, a detail vertical section through another modified form of apparatus, and Fig. 7 a like view of another modification.

Like letters of reference indicate like parts in all the drawings.

My invention relates to drying apparatus, and particularly to the circulatory heating and ventilating devices thereof. The invention could be applied to a variety of heaters—in fact, to almost any sort of a device for removing the moisture from material by evaporation. I have, however, here shown and described my invention as applied to the drying of clothes hung upon racks in an inclosed chamber. This apparatus consists in general of a drying-chamber, a source of heat-supply, and an air-circulatory system. The drying-chamber may be made in any desired manner—as, for example, it may be a sheet-metal cabinet formed of the side pieces A A, the back sections A', and the top A². Within the drying-chamber are a number of clothes-racks. These are preferably movable and may consist of the front sections B B, which form a closure for the front of the drying-chamber, the back sections B', and between these sections clothes bars or frames B² B², spaced apart conveniently for holding the clothes to be dried. The front sections are provided with hand-grips B³ B³ B³. The racks are provided with the trolleys B⁴, by means of which they are mounted to run on overhead tracks B⁵, secured to the ceiling of the room in any desired manner—as, for example, by the hangers B⁶. The rack-sections may therefore be separately drawn in and out of the drying-chamber. The tracks B⁵ are notched at B⁷, so as to provide a stop to

limit the inward movement of the rack-section. The lower part of the front of the drying-chamber is closed by means of a hinged door C. Below the racks is a screen B⁸ to catch any clothing which may by accident fall from the racks.

The air for drying the clothes may be heated and introduced into the drying-chamber in any preferred manner. I have here shown a gas-stove which is made substantially airtight, except for its communication with the drying-chamber. This stove consists of a simple fire-box D, resting on a base-plate D', provided at the back with a flue D², the entrance to which is closed by a damper D³. The top plate of the stove is preferably constructed with an aperture D⁴ with an offset flange D⁵, into which fits a cover or lid D⁶ or into which may be set a boiler or the like. At the back of the fire-box is preferably the deflecting-plate D⁷, and a lighting-door D⁸ is provided at the front. The burners may be of any desired type and are here shown as consisting of three transverse perforated pipes E E E, connected with a supply-pipe E' and controlled by the cocks E² E² E². The air from the stove passes through the flue D², which extends into the center of the drying-chamber and has the deflector D⁹, secured to the mouth of the flue D² by the braces D¹⁰ D¹⁰, so as to send the hot air in all directions in the drying-chamber. The air thus entering the drying-chamber will of course pass upward through the clothes on the racks and dry the same.

In order to properly ventilate the clothes during the drying process, I introduce fresh cold air into the drying-chamber. It is one of the features of my invention that this cold air is introduced at the top of the chamber. This may be accomplished in various ways, one or more of which may be utilized in given clothes-drying apparatus.

In the form of apparatus shown in Figs. 1 to 4, inclusive, I have shown the cold air admitted through a long pipe or flue F, extending into and through the chamber from the bottom, its inlet end being provided, preferably, with a screen F'. I may also introduce the cold air by means of the hood device shown particularly in Figs. 1 and 2. To this end the sides A A of the drying-chamber are perforated at G G, and over these perforations, and extending for a considerable distance down the sides of the drying-chamber, are the hoods G' G'. I have found by ex-

periment that this form of device for admitting the cold air will practically prevent the escape of heat, while carrying off a considerable quantity of the moisture coming from the clothes on the racks, the hoods serving, in a sense, as condensers. The moisture drips down the hood G', while the hot air is evidently held from escaping in any appreciable amount by its levity and by the incoming stream of cold air. This effect seems to be enhanced by the tapering shape of the hood and by arranging the narrow end of the hood close over the apertures G. In Fig. 5 I have shown a slight modification, the intake perforations G and the hood G' being placed lower down on the side of the drying-chamber. In Fig. 6 the drying-chamber is shown as formed by double walls H H, the outer wall being perforated at the bottom, as shown at H', and the inner wall at the top, as shown at H². A slightly-different form of intake for cold air is shown in Fig. 7. I have provided a plurality of pipes lying along the wall of the drying-chamber. One of the pipes (indicated by the letter J) is shown in this figure. The others are arranged parallel therewith.

The air leaves the drying-chamber near the bottom, being carried off through a pipe or flue K. The pipe K is preferably provided with the short lower branch K', having the cross K², and the longer upper branch K³, having the cross K⁴, extending transversely of the drying-chamber at its forward end. The lower portions of these pipes are provided with the perforations K⁵ K⁵.

The stove may be fed with air in any usual manner; but, preferably, I take the air so required from the drying-chamber. To this end an air-duct L is provided leading from the lower part of the drying-chamber into the front of the stove and discharging through the upright pipes L' L', which open immediately under the gas-burners. I may also provide a sliding duct L², connecting the drying-chamber with the fire-box of the stove, this duct being operated by the handle L³, which for convenience is hinged at L⁴. A stop L⁵ on the top of the duct abuts against the deflector-plate D' to limit the backward travel of the duct.

The use and operation of my apparatus are as follows:

As heretofore stated, my invention may be put to a variety of uses in connection with apparatus appropriate to the handling of the particular material to be treated. I therefore do not limit myself to its use in connection with the drying of clothes described. This application of the invention, however, will illustrate the principles of heating and ventilation which make up the subject-matter of my invention. In using this form of apparatus the clothes-rack sections are pulled forward and the clothes hung on the

bars B², the sections then being pushed back into the drying-chamber, which is thereby effectively closed. The gas-burners of the stove are then lighted, the damper D³ being of course turned back, so as to allow the heated air to pass from the stove in through the duct D² and upward among the clothes to be dried. The sliding duct will preferably be drawn forward, so that the air coming into the stove is delivered at the forward end and a draft created which carries the heated air backward through the flue D². The heated air will of course rise through the racks of clothing; but insomuch as cold air is being continuously introduced at the upper end of the drying-chamber while the vapor-laden air is being carried off from the lower end of the chamber the circulation in general through the drying-chamber will be from top to bottom. This arrangement insures a very even temperature through the drying-chamber and also a very perfect and efficient ventilation of the clothes, approximating, if not equaling, the best results obtainable in drying the clothes in the open air, while of course the operation may be much more rapid. The carrying off a portion of the moisture coming from the clothes near the top of the drying-chamber, which is done, as has been stated, without material loss of heat, expedites very considerably the process of drying.

The stove may be used to heat a clothes-boiler and at the same time to supply heated air to the drying-chamber, or when it is desired to use it only for heating the boiler or the like the damper D³ may be closed partially or fully and the sliding duct L² pushed back, so that the hot air is directed toward the aperture D⁴, over which the boiler is placed. By means of the lid D⁶ flat-irons may be heated in the same manner.

It will be seen that my invention comprises, generally speaking, a drying-chamber with means for heating such chamber, intakes in the upper part of the chamber for the admission of a ventilating-draft and various devices for discharging the moisture-laden air from such chamber. The heating of the chamber may obviously be accomplished by the direct admission of hot air or by the use of a drum or radiator. I prefer for economical reasons to admit the air immediately to the chamber, and this may be done provided the right sort of heater is used. It will be observed, however, that my flue D² serves, also, as a drum or radiator, so that the provision for the admission into the chamber of heated air is not absolutely essential. It is very important that the heat should be admitted in the lower part of the chamber, as otherwise it will be necessary to have an artificial draft through the apparatus in order to carry the hot air downward. It is also important that the cold air, which is heaviest,

should be admitted near the top of the chamber; but in order to do this it becomes expedient to have some means for preventing the escape of heat from the cold-air intake. I have found from experiment that the various devices which I have shown are well adapted to this end and particularly the hood device, (shown in Fig. 2,) which not only permits the entrance of plenty of cold air, but also serves to conduct off the moisture without allowing the heated air to escape from the chamber. Just how this happens I am not prepared to state, although it is apparently because of the levity of the hot air which is met and forced back by the constant stream of cold air, the contact of the hot moist air with the relatively cool hood and the stream of cold air causing the precipitation of moisture. I have found by experiment, for example, that the tapering hood, such as shown at G', Fig. 2, works better than one which is wider at the top. The invention furthermore consists of means for drawing the air out of the drying-chamber, such means being preferably located at the bottom of the chamber below the hot-air discharge. While all of these features may not be essential to the working of the apparatus, they certainly do contribute to a certain extent to its proper operation. By the construction shown a higher degree of economy and a very perfect ventilation is obtained without any artificial draft and, as it were, automatically.

I claim—

1. In a drier, the combination of a drying-chamber with a heater connected so as to supply heat thereto, and a duct leading from the chamber into the heater, said duct movable so as to discharge at different places in the heater.

2. In a drier, the combination of a drying-chamber, with a heater connected so as to supply heat thereto, and a sliding duct leading from the chamber into the heater.

3. In a clothes-drier, the combination of a drying-chamber with a plurality of clothes-racks in said chamber, a gas-stove, a flue leading from the gas-stove and discharging below the racks, means for admitting a ventilating-draft into the chamber above the racks, and means for discharging the air out of said chamber from below the hot-air flue.

4. In a clothes-drier, the combination of a drying-chamber with a plurality of clothes-racks in said drying-chamber, an air-intake at the upper part of said chamber, means for admitting heat to the chamber below the racks and means for causing a ventilating-draft of fresh air to pass downwardly through the racks.

5. In a drying apparatus, the combination of a casing forming a drying-chamber, with means for supporting the articles to be dried in said chamber, means for introducing heat

below said supporting means, means for introducing a volume of cold air directly to the upper part of the chamber, and means for discharging air from the lower part of said chamber.

6. In a drying apparatus, the combination of a casing forming a drying-chamber, means for supporting the articles to be dried in said chamber, means for introducing heat below said supporting means, means for introducing a volume of cold air into said chamber, said means comprising air passage-ways leading from outside the drier directly into the upper part of said chamber, and means for discharging air from the lower part of said chamber.

7. In a drying apparatus, the combination of a casing forming a drying-chamber, means for supporting the articles to be dried in said chamber, means for introducing heat below said supporting means, means for introducing a volume of cold air into said chamber, said means comprising air passage-ways leading from outside the drier directly into the upper part of said chamber, means for discharging air from the lower part of said chamber, and means associated with said air passage-ways for preventing the escape of hot air through the same.

8. In a drying apparatus, the combination of a casing forming a drying-chamber and having apertures in the upper part to admit a volume of cold air directly into the upper part of the drying-chamber, with means for supporting the articles to be dried, means for introducing heat below said supporting means, hood devices on the outside of the casing extending over said apertures, and means for discharging air from the lower part of said chamber.

9. In a drying apparatus, the combination of a casing forming a drying-chamber, the lower part of said casing being closed and the upper part provided with air passage-ways to admit a volume of cold air directly to the upper part of said chamber, means for supporting the articles to be dried within the drying-chamber, a heater outside of said casing and connected with the same so as to introduce heat into the drying-chamber below the supporting means, and a flue leading from the bottom of the casing into the heater.

10. In a drying apparatus, the combination of a casing forming a drying-chamber, the lower part of said casing being closed and the upper part provided with air passage-ways to admit a volume of cold air directly to the upper part of said chamber, means for supporting articles to be dried within the drying-chamber, a heater outside of said casing, a flue leading from the heater and opening into the drying-chamber below said supporting means, and a flue leading from the bottom of the casing into the heater.

11. In a drying apparatus, the combina-

tion of a casing forming a drying-chamber, the lower part of said casing being closed and the upper part provided with air passage-ways to admit a volume of cold air directly
5 to the upper part of said chamber, means for supporting the articles to be dried within the drying-chamber, a heater outside of said casing and connected with the same so as to introduce heat into the drying-chamber below
10 the supporting means, a flue leading from the bottom of the casing into the heater, and an outlet-pipe extending upward from the lower part of the casing.

12. In a drying apparatus, the combination of a casing forming a drying-chamber, the lower part of said casing being closed and the upper part provided with air passage-ways to admit a volume of cold air directly
15 to the upper part of said chamber, means for supporting the articles to be dried within the drying-chamber, a heater outside of said casing and connected with the same so as to in-

roduce heat into the drying-chamber below the supporting means, a flue leading from the bottom of the casing into the heater; and an
25 outlet-pipe extending from the lower part of the casing upward through the drying-chamber.

13. In a drying apparatus, the combination of a casing closed at the bottom and having
30 apertures at the top, said casing forming a drying-chamber, hood devices on the outside of the casing flaring at the bottom and extending closely over the apertures, means
35 for supporting the articles to be dried in said drying-chamber, means for introducing heat into the chamber below said supporting means, and a discharge-pipe leading upward from below the heat-introducing means.

FRANCIS T. JOHNSON.

Witnesses:

PERCIVAL H. TRUMAN,
HOMER L. KRAFT.