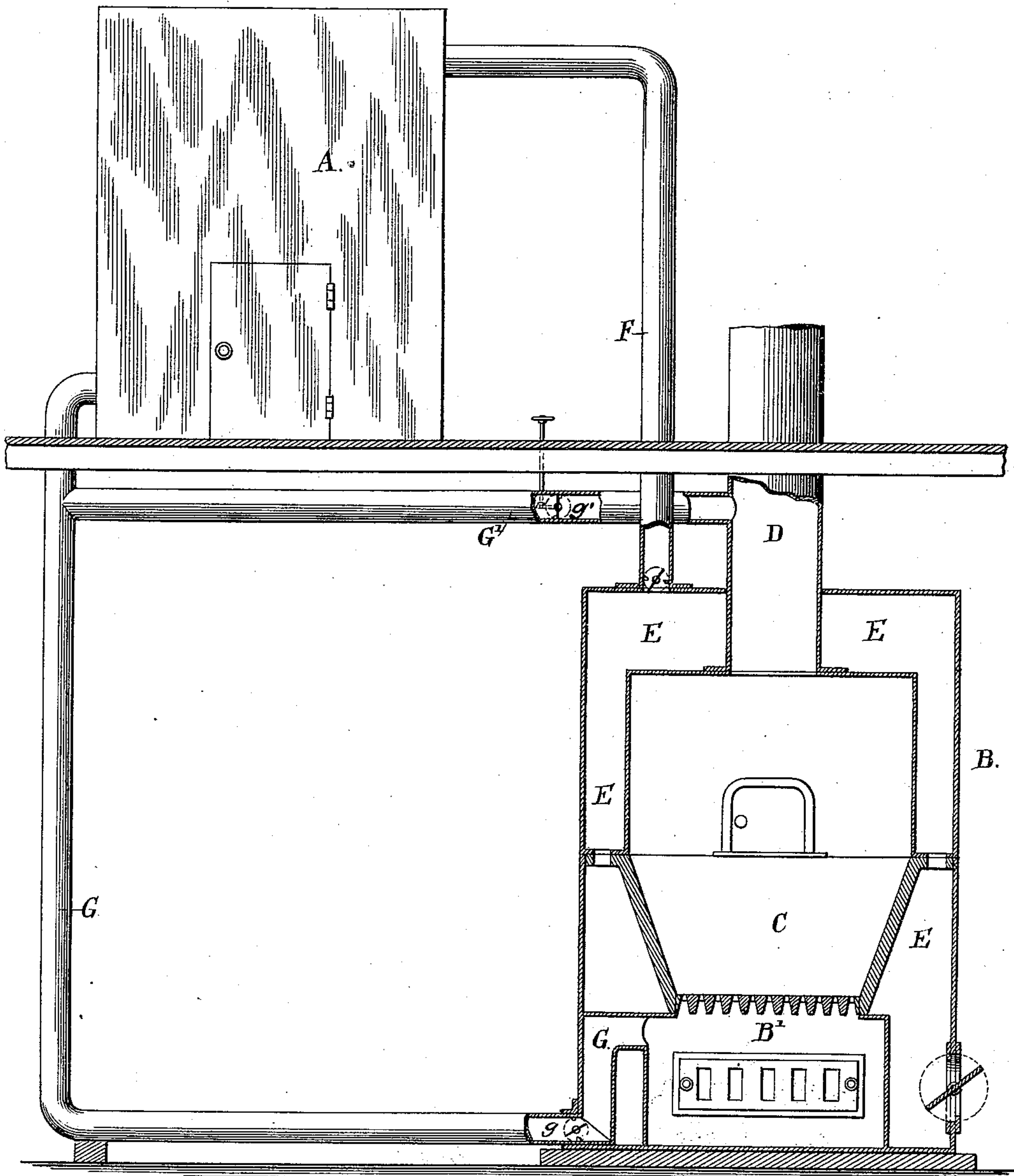


(No Model.)

L. J. CADWELL.
DRIER.

No. 353,016.

Patented Nov. 23, 1886.



Witnesses:-

Louis M. Whitehead.

C. C. Poole

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by:-

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UNITED STATES PATENT OFFICE.

LYDIA J. CADWELL, OF CHICAGO, ILLINOIS.

DRIER.

SPECIFICATION forming part of Letters Patent No. 353,016, dated November 23, 1886.

Application filed July 3, 1885. Serial No. 170,631. (No model.)

To all whom it may concern:

Be it known that I, LYDIA J. CADWELL, of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Method of Utilizing Moisture-Laden Air Derived from the Operation of Drying Articles by Air; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which forms a part of this specification.

This invention relates to drying apparatus constructed to utilize as fuel the vaporous air derived from drying apparatus of any description in which air is employed as the vehicle for taking up and carrying off the moisture and gases from the article or articles being dried.

In apparatus for drying by air a fire is commonly present for first heating and drying the vehicle air in order to increase its capacity for absorbing moisture from the articles to be dried, and to furnish the means for producing a forcible current of the drying air. In other cases a fire is employed to ultimately actuate a fan, or some other means for producing an active movement of air, not dried or heated, in contact with the articles to be dried. In any case the cost of the fire is an element in the expense of the drying.

It is the object of this invention to produce an improved drying apparatus adapted to utilize the waste product of the drying operation, or the moistened air and the gases which are expelled from the drying-chamber, so far as may be practicable or desirable, in supporting the fire, and thus reducing the cost of its maintenance by lessening the quantity of other fuel employed. While the invention is applicable to any form of drying apparatus which employs a moving body of air, and while it is the intention to herein so claim it, said invention is illustrated in the accompanying drawing as applied to an apparatus of which a "hot-air" or air-heating furnace forms a part.

In said drawing, A may represent any drying-chamber or inclosure of an air-drier of any known or desired construction, within which chamber are contained the articles to be dried.

B is a furnace, of which C is the fire-box, D is the chimney, and E is a space for the pas-

sage of air to be heated or dried by the furnace-fire preparatory to its passage through the drying-chamber. F is a pipe leading from the air-space of the furnace to the drying-chamber and preferably into its upper part, and G is a pipe which conducts the air from the drying-chamber to the fire. The pipe G preferably leads from the lower part of the drying-chamber, and desirably, though not necessarily, enters the fire-box from below or by way of the ash-chamber B' and through the grate. G' is a branch pipe leading from the pipe G to the chimney D.

Any other form of air-heating devices may be employed.

In the operation of drying any article or articles contained in the chamber A by the passage of air from the pipe E to the pipe G through said chamber and in contact with such article or articles the air, besides taking up the gases emitted therefrom, becomes more or less laden with moisture in the most attenuated or subdivided form of vapor. I have found that by delivering this moisture-laden or vaporous air to the fire it so far supplies material for combustion as to greatly reduce the quantity of coal or other fuel required to maintain a given heat, and to thereby greatly reduce the cost of running the apparatus. Of course this result so far as the hydrous air is concerned is obtained primarily by the resolution of the water and air into their elements, followed by their union with the elements supplied by the other fuel present in the regular operation known as "combustion," and I am aware that steam and air have been heretofore employed as fuel and in aid of combustion in furnaces. I therefore do not claim to have discovered any new law of nature, or to be the first to apply the law which is in operation in this case. I do claim, however, to be the first to have utilized the waste product of drying by air by conducting the moisture-laden air from a drying-chamber as fuel to a fire.

It is to be observed that this method presents many points of difference when compared with the use of steam and air, and has several advantages over such use of steam and air. First, the water is less in relative quantity, and is more attenuated than in the form of generated steam, and said moistened air is therefore

adapted to be used in connection with a lower fire without danger of extinguishing it and without requiring the watchful attendance necessary to the use of steam and air; second, the diffusion of the water throughout the body of air is more complete and more favorable to the prompt and proper resolution of the body and to the combustion of the products when introduced to the fire; third, the generation of steam requires the use of a generator for its production, while the body of combined air and water made available for combustion in this case is the necessary product of the drying operation exclusively, and, instead of being specially produced at a cost, is a waste, except when utilized as described; fourth, by this method not only is the water which is taken up by the air utilized as fuel, but when heated air is used as the drying medium that portion of the heat which is returned in the moistened air to the fire is saved by reason of the better results obtained from supplying heated instead of cold air to a fire; fifth, the combustible gases derived from the articles being dried are also utilized as fuel, while all odors are prevented by the passage of the gases through the fire.

Inasmuch as it will not always be desirable

to conduct to the fire the entire body of moisture and gas-laden air taken from the drying-chamber, the pipe G is shown as being provided with a branch, G', leading directly to the chimney F, and suitable dampers are shown at g and g' by which to divert the said vaporous products, as may be found desirable in particular cases or in different stages of the drying operation.

The novel features of the apparatus by which this method of invention is applied will form the subject of another application for patent.

I claim as my invention—

The combination of a closed drying-chamber, a pipe leading from a hot-air furnace into the said chamber, a pipe leading from the said drying-chamber back to the fire-grate, a branch pipe leading from this latter pipe to the smoke-flue, and suitable dampers in said pipes, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

LYDIA J. CADWELL.

Witnesses:

M. E. DAYTON,
JESSE COX, Jr.