

(No Model.)

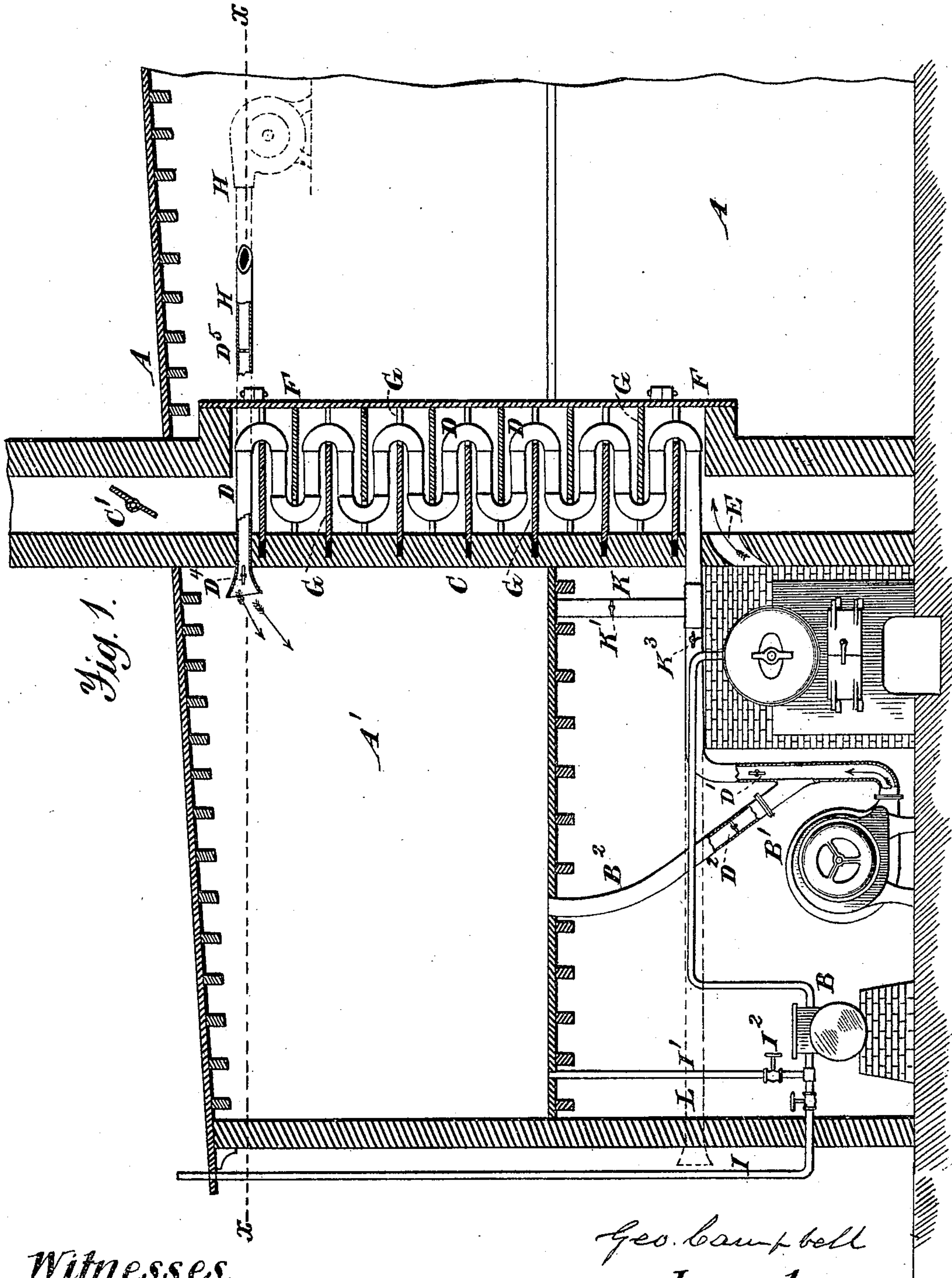
2 Sheets—Sheet 1.

G. CAMPBELL.

APPARATUS FOR DRYING TOBACCO.

No. 248,576.

Patented Oct. 25, 1881.



Witnesses.
A. Rupert
C. M. Connell

Geo. Campbell
Inventor.
Holloway & Blanchard
Attys

(No Model.)

2 Sheets—Sheet 2.

G. CAMPBELL.
APPARATUS FOR DRYING TOBACCO.

No. 248,576.

Patented Oct. 25, 1881.

Fig. 3.

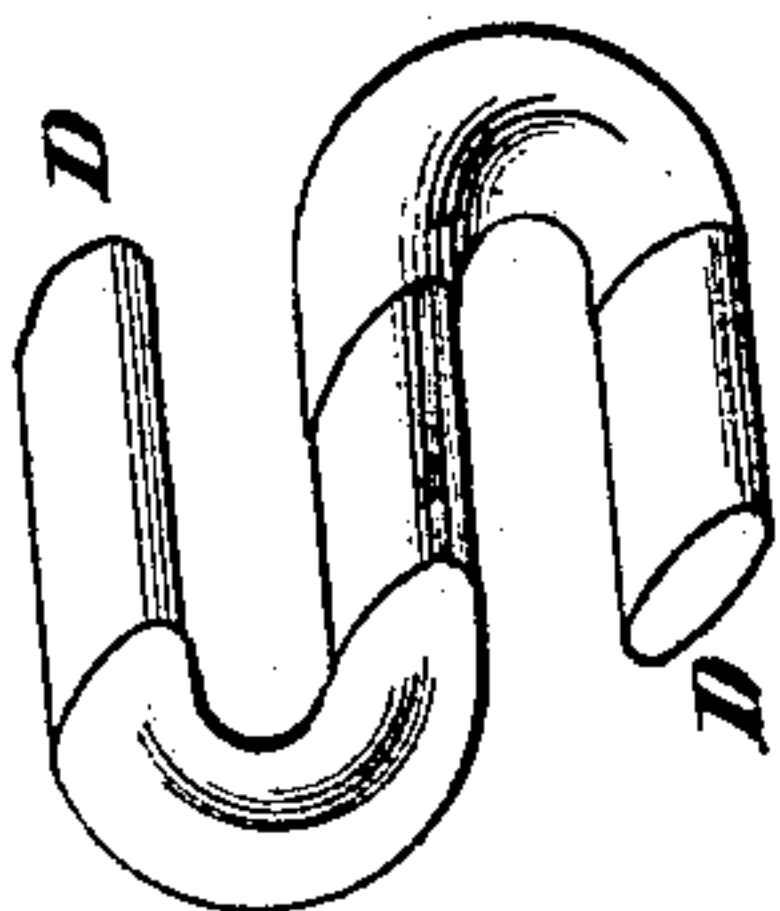


Fig. 4.

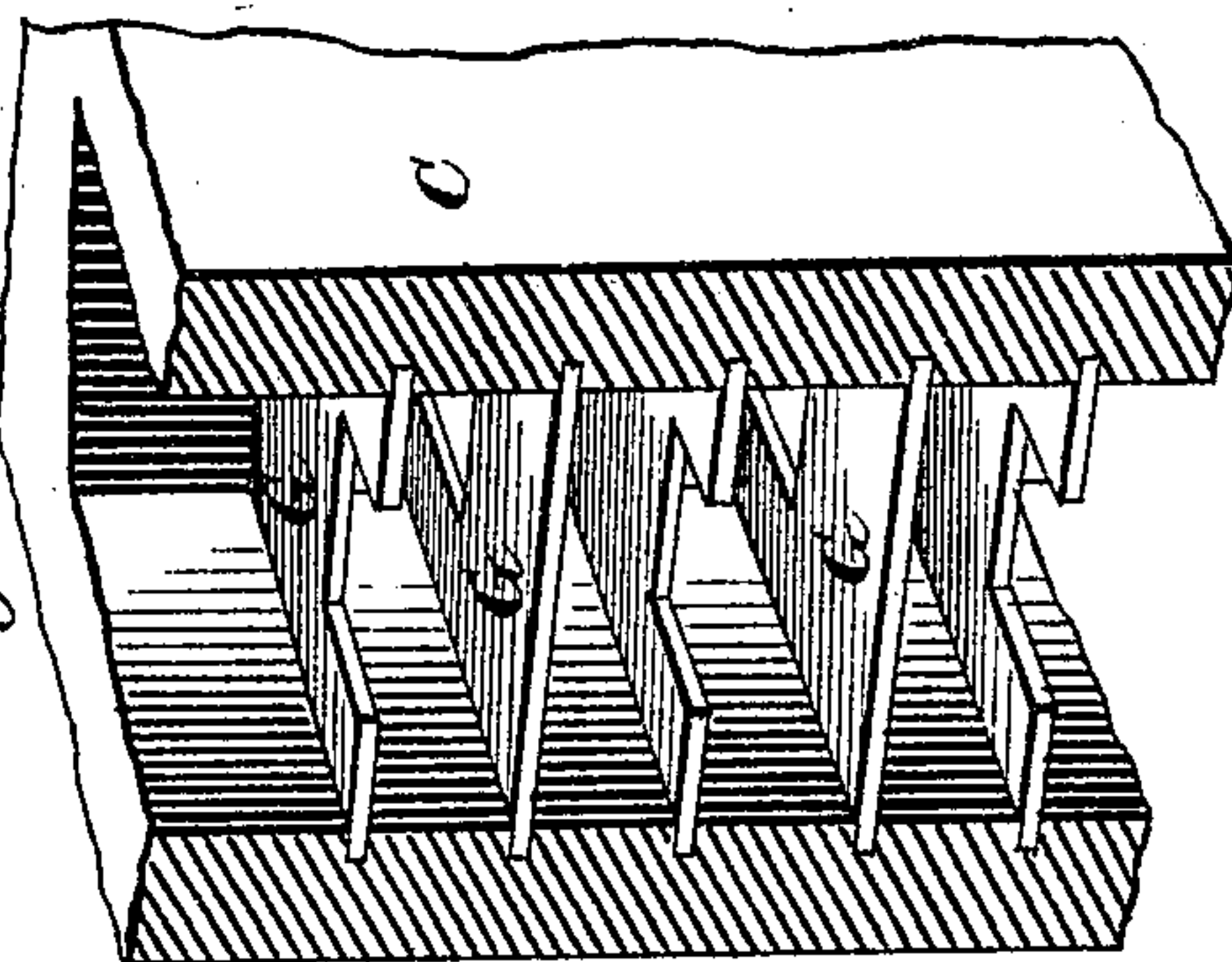
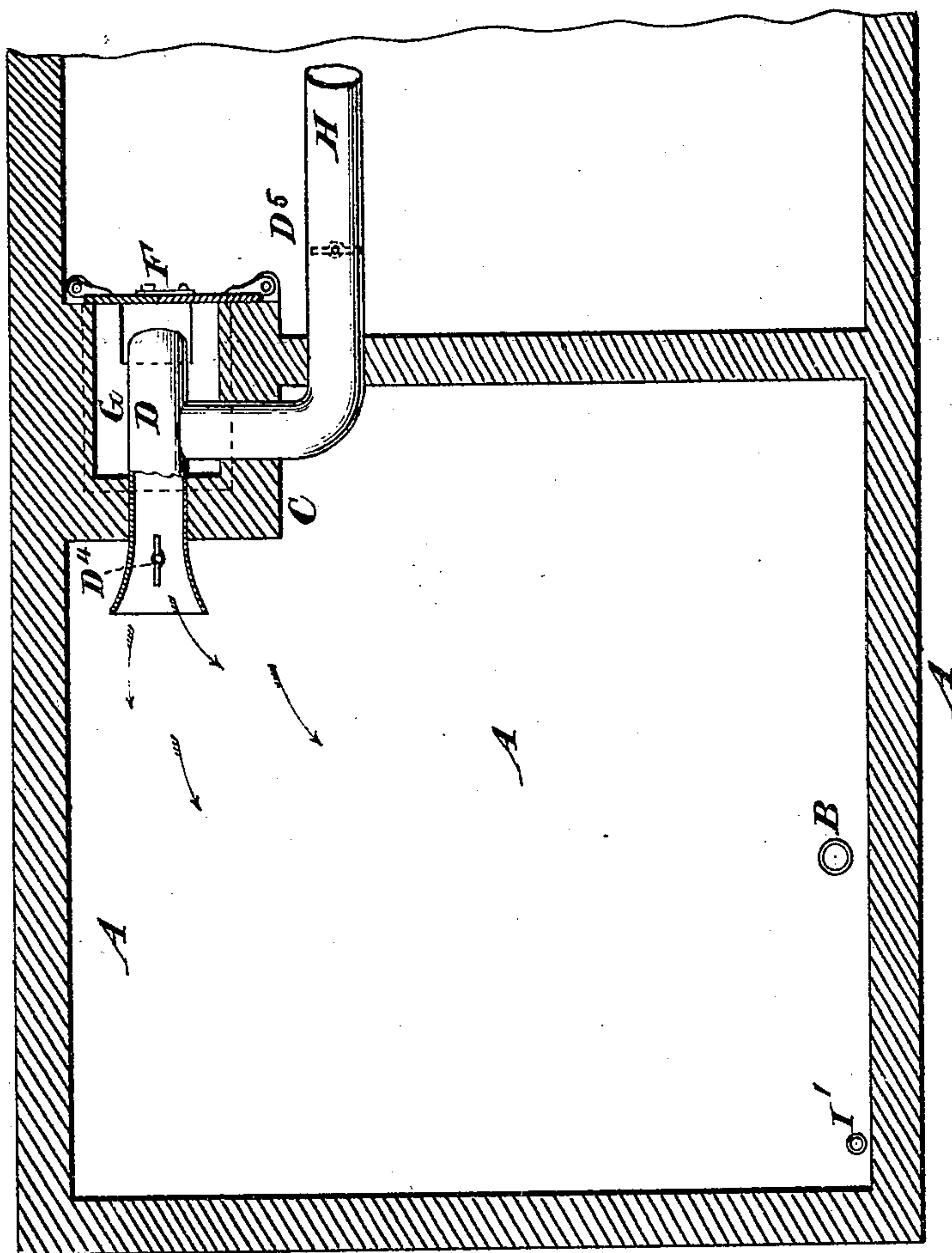


Fig. 2.



Witnesses
A. Ruppert,
C. M. Cornell

Geo. Campbell
Inventor.
Holloway & Blanchard
Attys

UNITED STATES PATENT OFFICE.

GEORGE CAMPBELL, OF RICHMOND, VIRGINIA.

APPARATUS FOR DRYING TOBACCO.

SPECIFICATION forming part of Letters Patent No. 248,576, dated October 25, 1881.

Application filed February 14, 1881. (No model.)

To all whom it may concern:

Be it known that I, GEORGE CAMPBELL, a subject of the Queen of Great Britain, residing at Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Apparatus for Drying Tobacco; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to an improved apparatus for drying tobacco and other substances; and the objects of my improvements are, first, to provide novel devices for drying such substances by air heated by the waste heat in passing through the chimney or uptake of a steam-generator or other furnace, and afterward exposing them to the action of cool air for the purpose of reducing the temperature; and, second, to provide the necessary combinations of devices for thus heating and cooling the substances.

Heretofore air has been forced by a fan into pipes, parts of which have been located in the chimneys or uptakes of furnaces in which fuel is burned, and thence to grain-driers and other drying-chambers; but none of those with which I am acquainted presents the construction and combinations of devices for such purposes which I employ. I therefore limit my invention to the combinations substantially as described and claimed in this specification. I attain these objects by the apparatus illustrated in the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, showing a portion of a building having in it a drying-room, and showing also a steam-engine for driving the moving machinery, a furnace and steam-generator, a fan for forcing into the pipe or pipes the air to be heated and conducting it to and from the heater, and an air-heater placed in the vertical flue through which the heated products of combustion pass in escaping to the atmosphere. Fig. 2 is a horizontal view on line *xx* of Fig. 1, showing a portion of a drying-room, of the air-heating pipe, and of the uptake or flue, and a door, which, when open, gives access to the interior there-

of. Fig. 3 is a detail view, showing the form of the air-heating pipe; and Fig. 4 is a perspective view of a portion of the uptake, showing slides therein for giving direction to the escaping products of combustion.

Similar letters refer to similar parts throughout the several views.

In constructing an apparatus for carrying into operation my method of drying tobacco and other substances I provide any suitable building, A, having in it one or more drying-rooms, A', in which the tobacco or other substance is placed, it being suspended from the ceiling in bunches or placed upon shelves, as desired. In the lower part of this building there may be placed an engine, B, for driving the fan B' and other machinery, and in any convenient position a steam-generator of any approved or preferred form, it being so arranged that the flue leading therefrom shall pass into a vertical flue or uptake, C, which, by preference, is made to pass up through the drying-room.

Within the uptake C there is placed a zig-zag pipe or vessel, D, the cross-section of which is greater in one direction than in the other. This form of pipe or vessel constitutes an important feature of my apparatus, as it provides for the presentation of a much greater amount of heating-surface for the air passed through it from the fan than it would if made cylindrical. This pipe or vessel in the example shown is oval in form, made of copper, and bent into the form shown in Figs. 1 and 3, for the purpose of increasing the amount of surface presented to the heating action of the escaping products of combustion from the furnace of the steam-generator, which enter the uptake through the flue E. (Shown in Fig. 1.) In order that this heater—the form of which may be varied, if desirable—may be placed in the uptake and removed therefrom, if necessary, there is placed upon one side of said uptake a door, F, the length of which is equal to that of the heating pipe or vessel, its width being sufficient to allow said pipe or vessel to be passed through the space occupied by it.

It is desirable to retain the heated gases or products of combustion in contact with the pipe for as great a period of time as is possible without checking the draft of the furnace to too great an extent, and to enable this to be done

grooves are formed in the sides of the uptake, into which plates of metal G G are slid, they being so arranged as to pass into each of the spaces left between the bends of the pipe D, such arrangement being clearly shown in Fig.

1. The pipe D, above alluded to, at its lower end passes out through the wall of the chimney to the fan B', it having a branch, B², from a point near the fan, or at any convenient point, for directing cold air to the drying-room when it is desirable to cool it after having been heated by hot air passing into it through pipe D. This provision for injecting into the drying-room both hot and cool air is an important one, as, after the tobacco has been properly dried, it is desirable to cool it down to the proper temperature for packing or for working before it is removed. For the purpose of enabling this to be done there is placed in the pipe D a valve, D', which, when open, will allow the air from the fan to pass to the heating-pipe D and into the drying-chamber, as indicated by the arrows, said pipe D being provided with a valve, D⁴, near its outlet end, for the purpose of delaying or regulating the discharge of air therefrom, and thus causing it to remain for a greater or less period of time in contact with the heating-surface, the effect of which will be to increase its temperature by the greater length of time it is thus retained.

In the branch pipe B² there is placed a valve, D², which, when closed, as shown in Fig. 1, will cause the air from the fan to pass through the heating-pipe D, as above described, but which, upon being opened, the valve D' being closed, will cause it to pass directly to the drying-room without being heated, by which means said room may be quickly cooled down to the proper temperature for the removal of the tobacco, thus accomplishing two results—the cooling of the tobacco before removing it and the rapid preparation of the room for a fresh supply.

For the purpose of retaining the heated gases escaping from the furnace for a greater or less period of time in contact with the pipe or vessel D, there is placed in the uptake C a valve, C', which may be opened or closed, or partially opened or closed, by which means the velocity of said gases will be regulated, and thus caused to remain for different periods of time in contact with said pipe.

Should it be desirable to take a portion of the heated air from the pipe D to another drying-room, or to any other place, it may be done by attaching to the heating-pipe D a branch pipe, H, and placing in it a valve, D⁵, for controlling the amount of air passing through it.

In treating or drying tobacco for certain purposes it frequently becomes necessary to moisten it—as, for instance, when it has been dried to such an extent as to cause it to be brittle, and thus liable to be broken or crumbled by handling; and to provide for the accomplishment of such a result there is attached to the exhaust-pipe I of the engine a pipe, I', which leads directly therefrom to the drying-room, it being supplied with a valve, I², for regulating

the amount of steam passing through it, and thus enabling the operator to admit to such room the exact amount needed to give the tobacco the character required.

For the purpose of allowing a passage for the products of combustion to escape through the uptake in first starting a fire, and at other times, the plates G are cut away, as shown in Fig. 4, such cutting away being upon opposite ends thereof, so that in passing the gases take a zigzag direction. These notches or apertures may be of greater or less width and length, according to the volume of gas that it is requisite to have pass them.

I have described the pipe D as being made of copper, as this is a good conductor of heat; but it may be made of any other kind of metal that will not be injuriously affected by the heat, and it may also be of any other equivalent form without affecting the principle of operation.

It is apparent that the air may be heated by the escaping gases from any other form of furnace as well as that of a steam-generator.

It is also apparent that the air to be heated may be forced into the heater at its upper end and delivered at its lower end into the pipe K, and be by it conducted to the drying-room, said pipe being provided with a valve, K', for shutting off the air when it is desirable to deliver it into the drying-room at the upper end of the heating-pipe. When this plan of delivering the air at the lower end of the heater is adopted the fan will be placed on or about on a level with the upper end of the heating pipe or vessel, as shown at H in Fig. 1, the effect of which will be to deliver the air to the point where it is to be used at a greater temperature than it will be when delivered from the upper end of the heating device. This method of utilizing the waste heat of furnaces is applicable to the drying of grain and other similar substances, and especially to laundries for drying clothes. When used for the latter and similar purposes where a large volume of air is not required, the air may be supplied through the induction-nozzle L, and thus caused to enter the heater by opening the valve K³ in the induction-pipe and closing the valve D' in the pipe leading from the fan.

If found desirable, two or more drying-rooms may be placed one above the other, so that while one is being filled or the material it contains is being dried the other may be emptied, and by extending the pipe which conducts the heated air thereto the alternate heating of such rooms may be accomplished and their alternate cooling may be effected by extending the one conducting the cold air to them.

It is further apparent that it may at times be desirable to regulate the draft of the chimney, and for this purpose the grooves in which the plates G G slide are extended into the wall of the uptake or flue, as shown in Fig. 1, so that if it becomes desirable to increase the draft they may be slid back into said grooves, and thus leave a passage of greater area for the gases from the furnace. When changes in the

positions of these plates become necessary or desirable they may be made by opening the door or doors F, which will enable the person in attendance to properly manipulate them.

5 Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The herein-described apparatus for drying tobacco and other substances, consisting
10 of a fan for forcing air through a pipe leading therefrom to a pipe or vessel in which it is to be heated, a zigzag or equivalently-formed pipe or vessel located in the flue or uptake of a
15 steam-generator or other furnace, such flue and uptake being located and relatively arranged as shown, suitable valves for regulating the flow of air through the pipe or vessel, and thus determining the temperature at which it shall be delivered therefrom, and a drying-
20 room in which the substance to be dried is placed, the construction and arrangement of the parts being substantially such as herein described, whereby a portion of the waste heat passing through the uptake is made available
25 in heating the drying-room.

2. In combination with the furnace and flue or uptake of a steam-engine or other fuel-burning device, the air-heating tube or vessel D,
30 fan B', and slides G, the parts being arranged substantially as and for the purpose set forth.

3. The combination, in an apparatus for drying tobacco, of a fan for forcing into the heating-vessel the air to be heated, a zigzag or equivalently-formed vessel which is located wholly within the flue or uptake of a steam-
35 generator or other furnace, and a room adapted for the reception of the tobacco to be dried, the arrangement of the parts being substantially such as herein described.

4. The combination, in an apparatus for drying, moistening, and cooling tobacco, of a fan
40 for forcing cold air, a pipe, B², connected to the delivery-pipe of a fan for conducting cold air to the drying-room, a valve for controlling the quantity of air thus admitted, a suitable
45 room for the reception of the tobacco to be cooled, and a pipe leading from the exhaust-pipe of a steam-engine controlled by a suitable valve, for admitting steam to the drying-
50 room for the purpose of moistening the tobacco, the parts being arranged for operation substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE CAMPBELL.

Witnesses:

C. M. CONNELL,
A. RUPPERT.