

(No Model.)

J. T. CHAFFEE & G. PRIEST.

Method of and Apparatus for Heating, Conducting,
and Utilizing Air.

No. 230,107,

Patented July 20, 1880.

Fig. 1

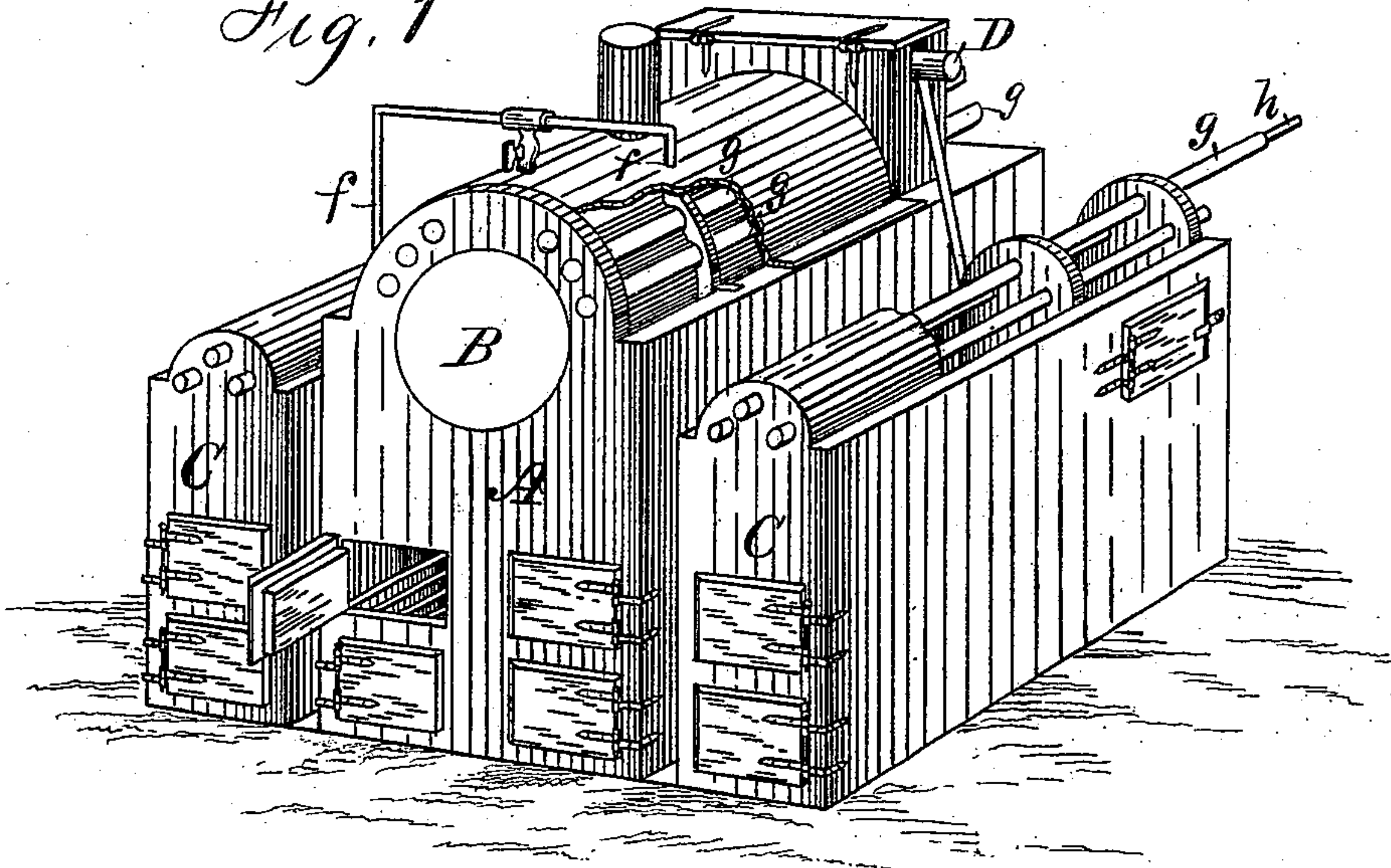


Fig. 2

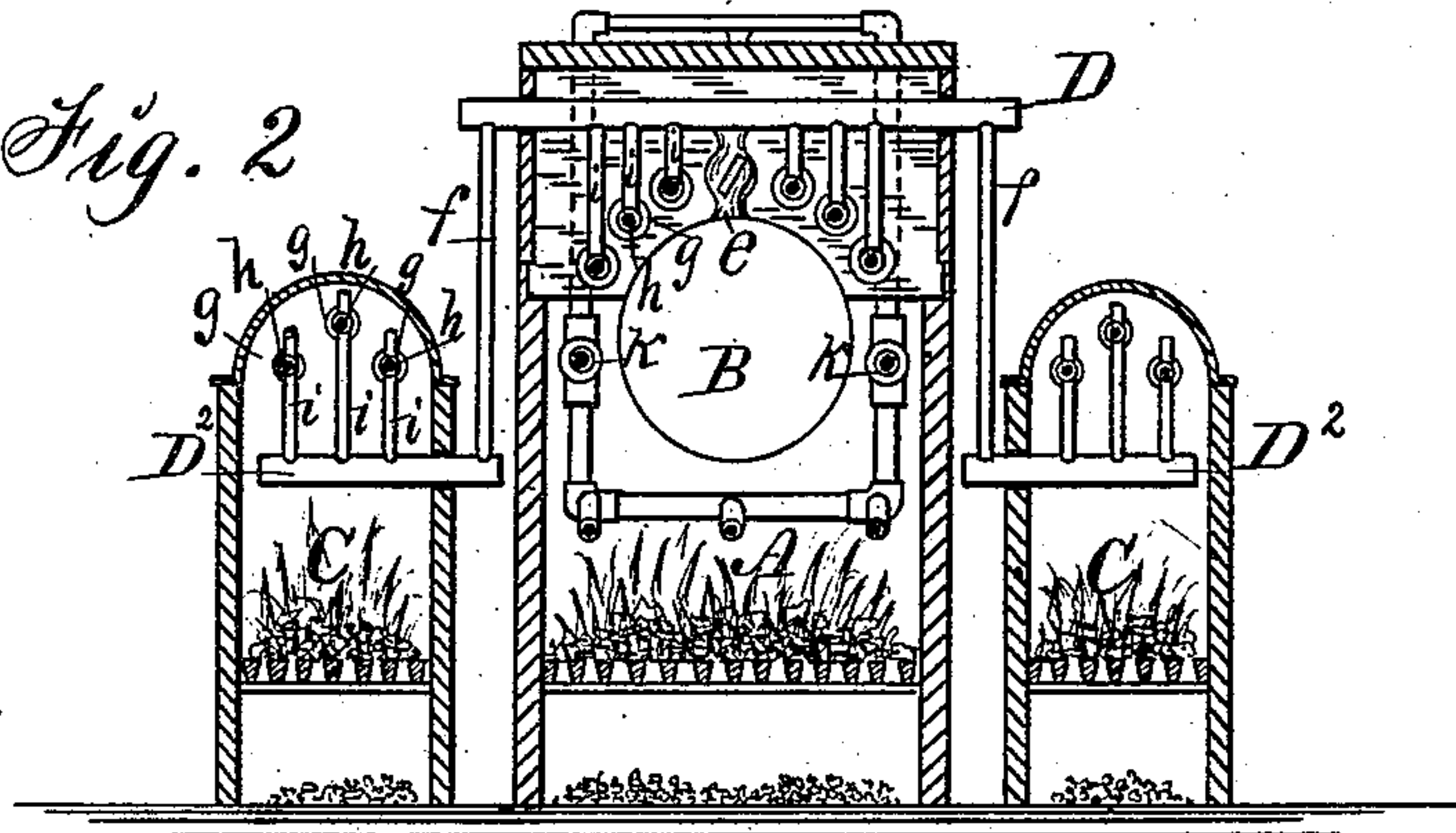
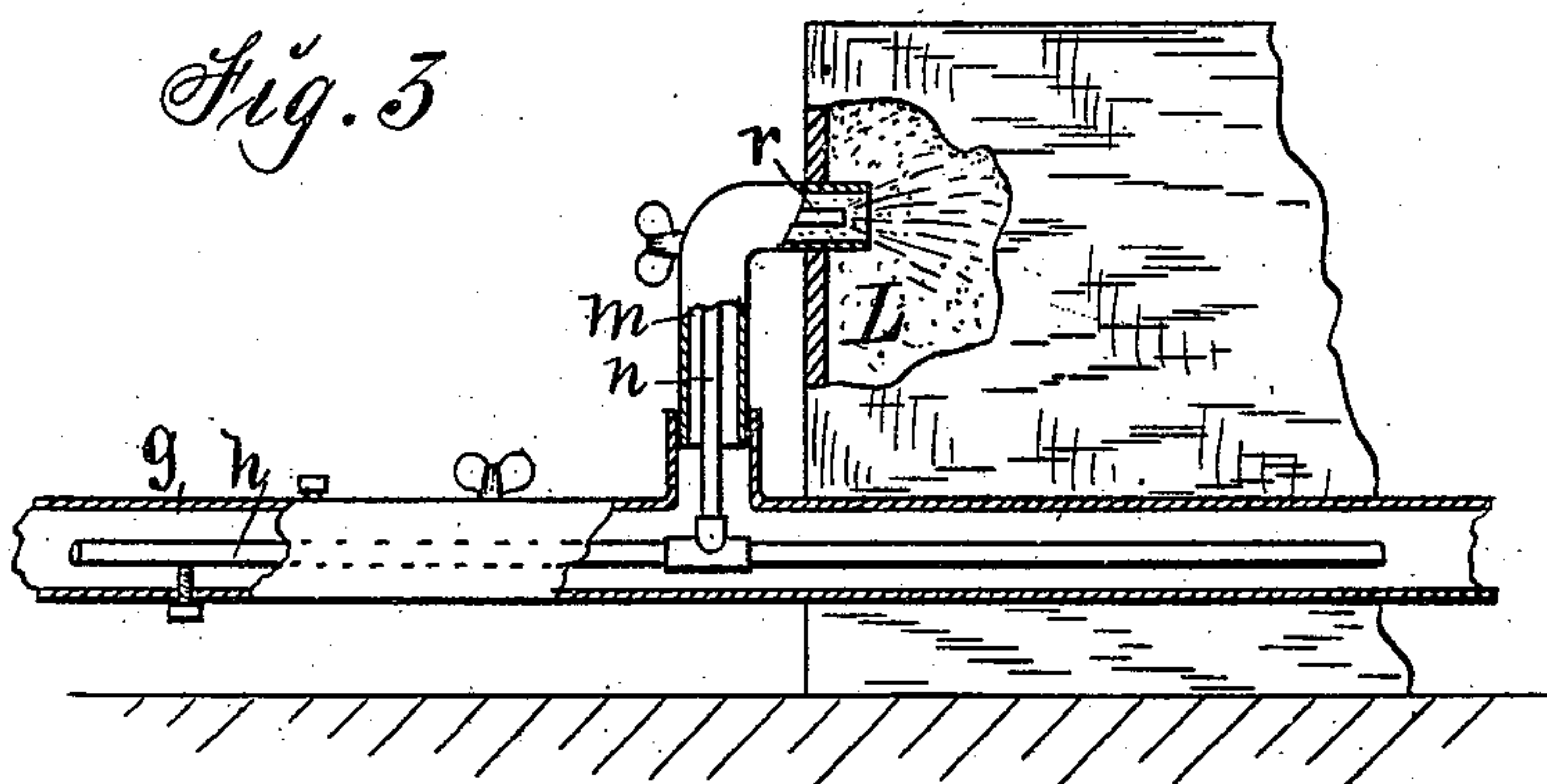


Fig. 3



Witnesses:
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UNITED STATES PATENT OFFICE.

JULIUS T. CHAFFEE AND GEORGE PRIEST, OF BLOOMFIELD, IOWA.

METHOD OF AND APPARATUS FOR HEATING, CONDUCTING, AND UTILIZING AIR.

SPECIFICATION forming part of Letters Patent No. 230,107, dated July 20, 1880.

Application filed March 15, 1880. (No model.)

To all whom it may concern:

Be it known that we, JULIUS T. CHAFFEE and GEORGE PRIEST, of Bloomfield, in the county of Davis and State of Iowa, have invented an
5 Improved Method and Apparatus for Heating, Conducting, and Utilizing Hot Air, of which the following is a specification.

Our invention contemplates controlling and jointly utilizing steam and hot air in such a
10 manner that the hot air will aid in superheating steam and preventing condensation at a remote distance from the generator, and the steam will aid in moving the hot air to remote distances from furnaces, as required in distrib-
15 uting and conveying hot air and superheated steam into kilns, ovens, radiators, and buildings, for the purpose of drying, baking, cooking, and warming buildings and collections of buildings in towns and cities.

20 Our invention consists, first, in the method of combining currents of steam and hot air to augment, distribute, convey, direct, apply, mingle, and utilize hot air and superheated steam at any time or place desired; second, in ar-
25 ranging and combining steam-generators, furnaces, steam-chambers, steam-conduits, injectors, air-conduits, and receivers, all as herein-after fully set forth.

Figure 1 of our drawings is a perspective
30 view of our apparatus, showing a steam-generator and two air-heating furnaces combined. Fig. 2 is a transverse section of the same, showing the steam-distributing reservoirs and air heating and conducting tubes combined. Fig.
35 3 is a section of our combined steam and air conveying tube and injector connected with a radiator. Together they illustrate the construction, application, and operation of our complete invention.

40 A represents the furnace, and B the boiler, of a steam-generator, that may be constructed of any suitable materials, and vary in form, size, and capacity, as desired.

50 C C represent air-heating and steam-superheating furnaces combined with the steam-generator. D is a steam-distributing chamber or reservoir, connected with the steam-chamber of the boiler B by means of a pipe, *e*. D² D² are steam-distributing chambers, located in the furnaces C, and connected with the chamber

D and boiler B by means of tubes *f f*. Any form of steam-distributing chambers and any number desired may be thus connected with a steam-generator to facilitate the superheating and distribution of steam.

55 *g g g* represent a series of air-conducting tubes that are open at their ends and extend through the furnace A and over the boiler B, where they are subjected to the products of combustion rising from the furnace-fire. Simi-
60 lar series of air-conducting tubes are also fixed in the furnaces C.

65 *h h h* represent steam-conducting pipes inclosed in the air-conducting tubes. Each one of these inclosed steam-pipes *h* is connected with one of the steam-distributing chambers, D or D², by means of a connecting-tube, *i*.

70 Valves or cut-offs may be formed and fixed in any suitable manner in any accessible portions of the air-tubes and steam-pipes, to regulate the transmission of air and steam, and the combined air-tubes and steam-pipes may be extended to and connected with a lumber or fruit drying kiln, a baking or cooking oven, a radiator, or building, or collection of buildings,
75 whether close by or remote from the furnaces.

80 These air and steam conduits may be made of metal, glass, earthenware, or other suitable material, and protected with armature, and inclosed with asbestos packing or other suitable incombustible material that is a non-conductor of heat.

85 *k k* represent combined air and steam conducting tubes and pipes extending into the combustion-chamber of the furnace A, to feed the furnace-fire with hot air and superheated steam, as required, to promote combustion, and thereby aid in generating heat and steam.

90 L in Fig. 3 represents a kiln, oven, radiator, or building into which heat is conducted from our air-heating and steam-superheating apparatus through our combined air and steam conduits *g* and *h*. *m* is a branch air-conducting tube extending from the main *g* into the receptacle L. *n* is a branch steam-pipe that
95 extends through the tube *m* from the main steam-pipe *h*, and terminates in an injector, *r*.

100 The combined mains *g* and *h* may be extended from the furnaces and steam-distributing chambers in any direction desired, and

branches *m* and *n r* may be connected at any point desired to take hot air and superheated steam therefrom, and inject it into any place desired, for the purpose of utilizing the combined currents.

In the practical operation of our invention steam is advantageously superheated in the hot-air tubes, and the injectors in the ends or branches of the air-tubes serve to draw the hot air from the furnaces to all points that can be reached by the steam-pressure, and thus a combined current of hot air and superheated steam can be economically generated, moved, divided, and practically applied to dry lumber, burn brick, bake, cook, and warm buildings in villages, towns and cities.

We are aware that a flux-pipe and a reflux-pipe have been combined with a furnace, and connected at a distance from the furnace by means of smaller pipes and radiators located in a building or series of buildings, to form a closed circuit, into which a blast of steam was injected to keep the current of air in the closed circuit in motion. The steam thus injected mingled with the hot air and was conveyed from the furnace and steam-generator in the same pipe that conveyed the hot air. Our apparatus and method for conveying and distributing hot air from a furnace or series of furnaces consist in inclosing a steam flux-pipe in a hot-air flux-pipe, and fixing laterals and

injectors at the various points of the combined steam and hot-air flux-pipes where the hot air is to be withdrawn, applied, and utilized, as hereinbefore set forth.

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We claim as our invention—

1. The hereinbefore-described method of moving, distributing, combining, and utilizing steam and hot air, (as distinguished from a closed circuit in which air is circulated and moved to and from a furnace by means of a steam-injector,) said method consisting in inclosing steam-pipes and injectors in hot-air conduits to convey and distribute superheated steam, and to therewith draw and distribute hot air, and to mingle and utilize steam and hot air at various places and distances away from one or more steam and heat generators, for the purposes specified.

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2. The combination of a steam-generator, one or more steam-pipes, *f*, one or more steam-chambers, *D*², and one or more furnaces, for the purposes specified.

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3. The combination of a steam-generator, one or more furnaces, an air-conduit, a steam conduit and injector, and a distant radiator or receiver, for the purposes set forth.

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Witnesses:

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