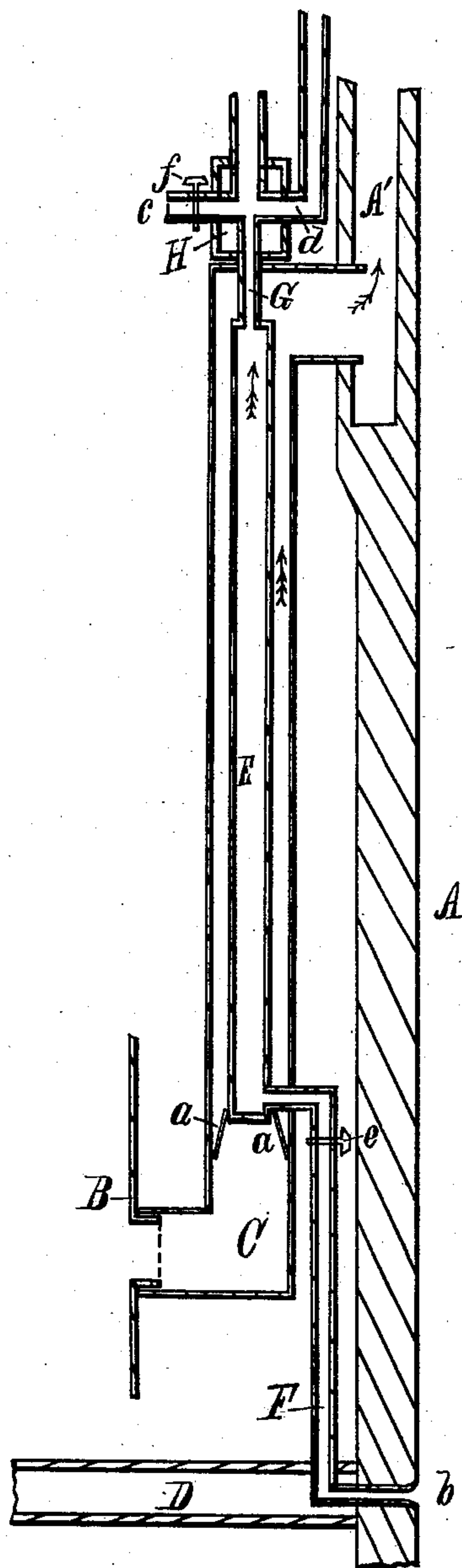


(No Model.)

E. H. GRAVES.  
HEATING APPARATUS.

No. 264,408.

Patented Sept. 12, 1882.



WITNESSES:

*Cyrus K. E. Jr.*  
*Joseph Lushington*

INVENTOR:

*Ephraim H. Graves.*  
*By Manahan & Ward-*  
*his attys.*

# UNITED STATES PATENT OFFICE.

EPHRAIM H. GRAVES, OF MORRISON, ILLINOIS, ASSIGNOR OF ONE-HALF TO  
O. F. WOODRUFF, OF SAME PLACE.

## HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 264,408, dated September 12, 1882.

Application filed February 10, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, EPHRAIM H. GRAVES, of the city of Morrison and State of Illinois, have invented a new and useful Improvement in Heating Apparatus, which improvement is fully set forth in the following specification and accompanying drawing.

The object of my invention is twofold: first, to utilize the waste heat which usually passes out of a stove-pipe and apply such heat to warm the same room or other rooms; and, second, to supply apartments with pure air heated while in its passage from the outer air to the apartments where discharged.

In the drawing the figure is a sectional side elevation of part of a stove, the pipe connecting the stove with the chimney, a part of the outer wall, and the relation and attachment of my invention to the aforesaid parts.

A represents the outer wall of a building, having the chimney or flue A'.

B represents the rear wall of a stove.

C is the pipe, connected in the ordinary way to the stove B at its lower end, and communicating in the usual way at its upper end with the chimney or flue A'.

D is the floor of the room, on which the stove B is seated.

E is a pipe or tube having continuous sides, and seated in any suitable manner inside of the stove-pipe C. For the purpose of affixing the tube E to the stove-pipe C, I use two short braces, *a a*, having their upper ends attached to the lower end of the tube E at opposite sides thereof, and either fastened to the pipe C at their lower ends, or, in case the pipe C sets on an iron collar of the stove, having their lower ends resting on such collar. The mode of fastening is not material and may be varied, the object being to fix the tube E, as near as may be, in the center of the stove-pipe C. The tube E is closed at the bottom, and communicates with the outside air by means of the supply-tube F, which latter, at its upper end, extends into the tube E at or near the bottom of the latter, and extends downwardly through the floor D and under the latter outwardly through the wall A at the opening *b*, where the tube F may be provided with an outwardly-flaring mouth to facilitate the ingress of the

air and a screen to prevent the entrance of dirt or obstructions. The upper end of the tube E is closed, except that there is seated therein the discharge-tube G. The discharge-tube G extends through the top of the stove-pipe C where the latter turns toward the chimney A'. Above the stove-pipe C the tube G is provided with the cross-sections *c d*, and for the sake of finish, and to secure the strength and permanency of the connections last aforesaid, this junction is inclosed in a cylinder, H. From the end of the discharge-tube G and cross-section *d* tubes conveying the heated air can be carried any distance in the building and to any apartment, however remote.

I furnish the supply-tube F, near its junction with the tube E, with the cut-off *e*, for convenience in shutting off the cold air when the heating is not desired. The cross-section *c* is intended to assist in heating the room in which the stove is situated, and such cross section is furnished with the cut-off *f*, for use when the entire heat is needed for other apartments. Each discharge-pipe which enters an apartment is furnished at its discharge end in such apartment with a like cut-off, by means of which the degree of heat in such apartment may be regulated or the supply of heat cut off.

The size of the pipe E will vary with that of the stove-pipe C. For an eight-inch stove-pipe I find a four-inch inner pipe to be of good operative size. I use gas-pipe for the tube E, as it is essential that there be no seams or joints in its walls to permit the gases in the stove-pipe C to escape into the tube E.

It is not necessary that the stove be placed next an outer wall, as the supply-tube F can be extended indefinitely until it reaches the outer air.

I do not limit myself to any size or character of pipe, nor to the precise locality and relation shown of the different pipes.

In the ordinary use of a stove-pipe the heat from the air lying interiorly next the walls of the pipe is partially radiated through the walls of such pipe; but the center column and greatest quantity of heat passes out with the draft and is lost.

If ventilation is not desired, the supply-pipe F may end and be supplied in the interior of



the room in which the stove is placed. The tube E may be placed in the drum of a stove.

The operation of my invention is as follows: By opening the cut off *c* the cold air from the outside passes into the tube E, is there heated, and, by opening the cut-offs in any of the discharge pipes, passes out in a heated condition at any locality desired. After the tube E is once heated the current of warm air therefrom is continuous, the cold air continually passing in to fill the vacuum.

The advantages of my invention are, first, that I obtain and utilize heat which would be otherwise lost; second, I pass into each apartment not the vitiated heated air of some other apartment, but the pure outside atmosphere; third, I can deliver the heated air at any desired point or elevation in any apartment, however remote, and this without losing any material amount of heat *in transitu*.

My invention is simple, practicable, and convenient, and is valuable alike on hygienic and economical grounds.

I am aware that a tube for heating and transmitting air has heretofore been placed in a stove-pipe.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

In combination with the discharge-pipe G and cross-pipes *c* and *d*, the cylinder H, substantially as shown, and for the purpose described.

In testimony that I claim the foregoing as my own I affix my name hereto in the presence of two witnesses.

EPHRAIM H. GRAVES.

Witnesses:

J. H. MASON.

O. F. WOODRUFF.