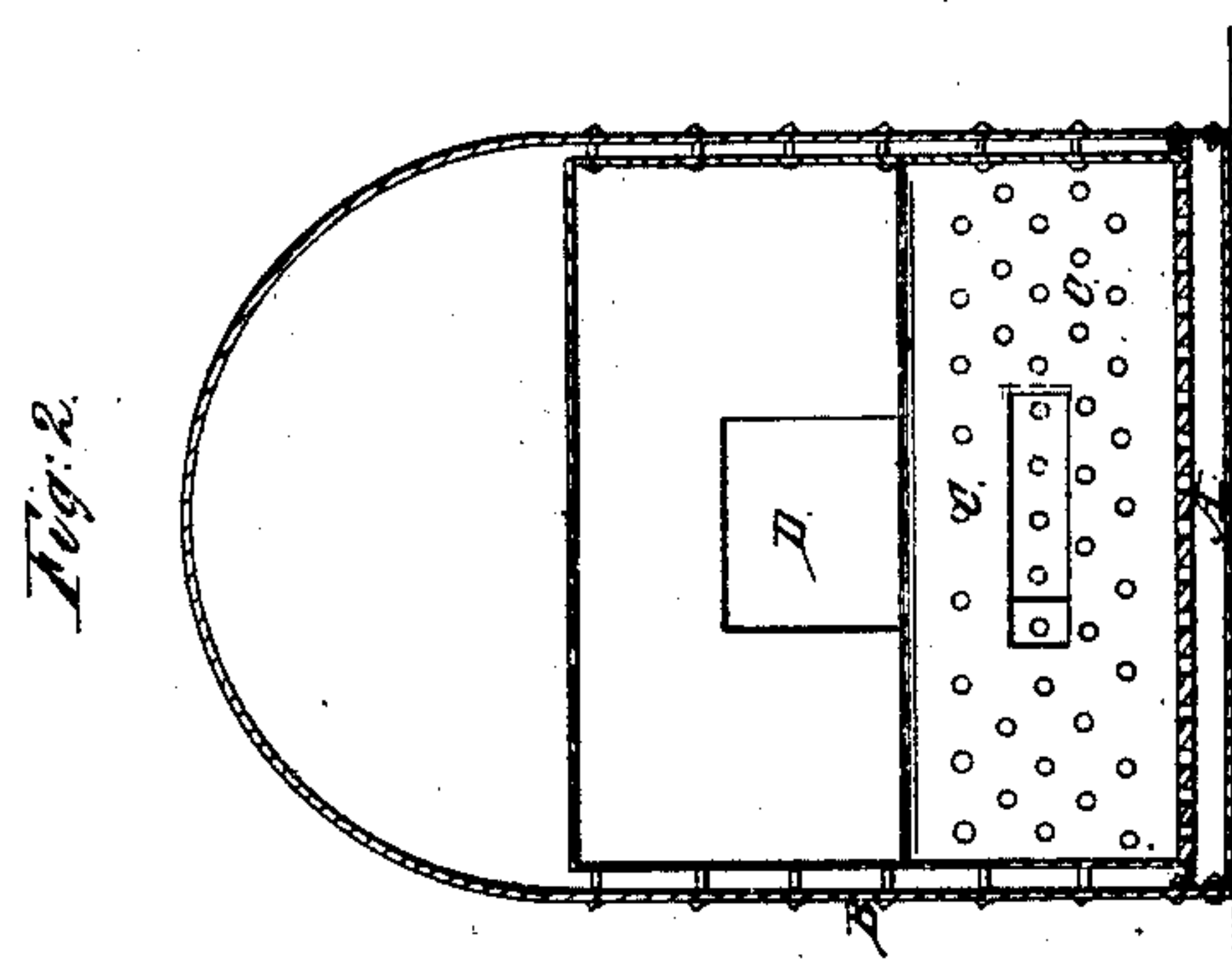
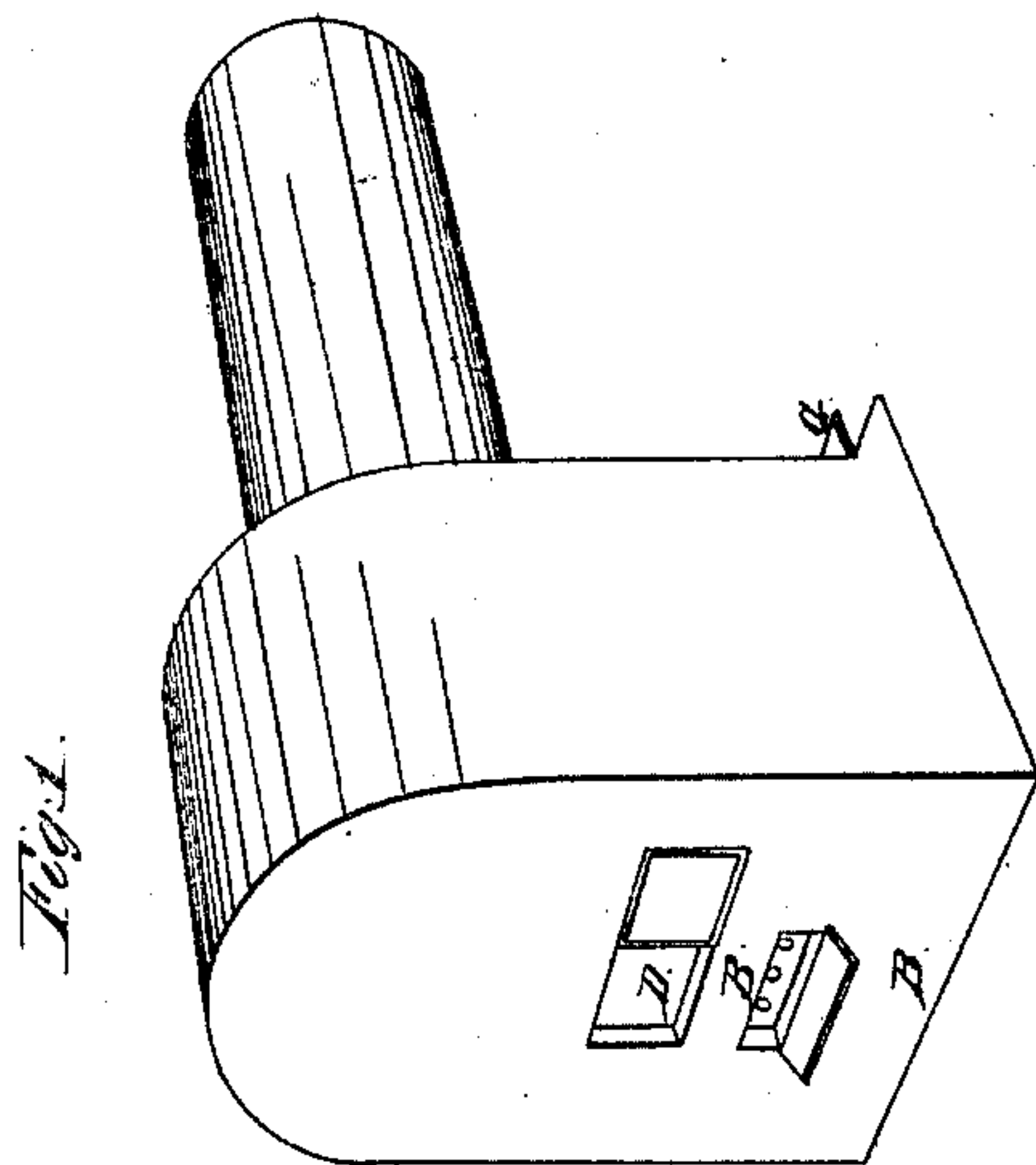
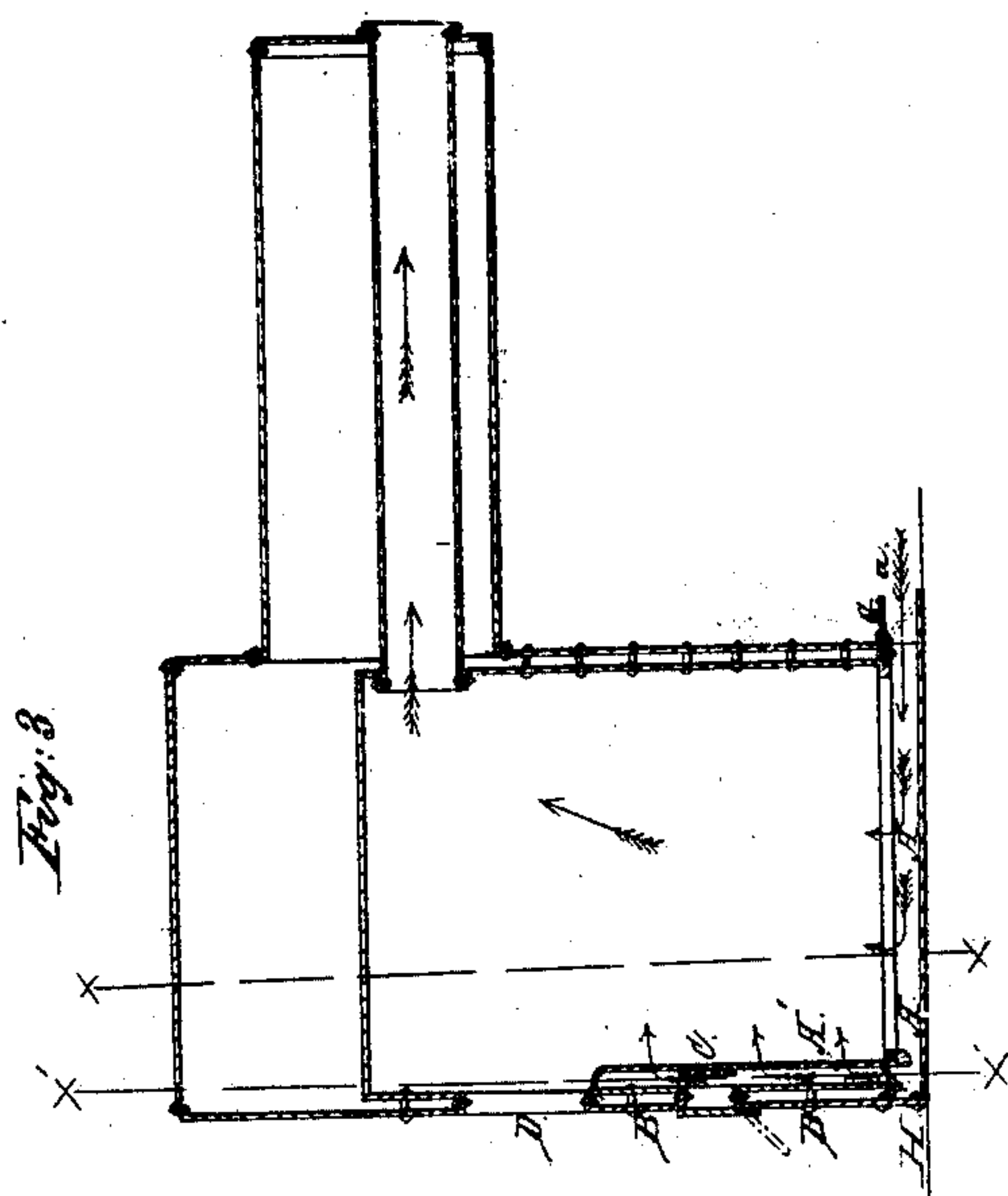


J. H. DUHME.  
FURNACE.

No. 24,547.

Patented June 28, 1859.



Witnesses,  
R. J. Campbell,  
J. C. Clifton.

Inventor,  
J. H. Duhme.

# UNITED STATES PATENT OFFICE.

JOHN H. DUHME, OF CINCINNATI, OHIO.

## FURNACE.

Specification of Letters Patent No. 24,547, dated June 28, 1859.

*To all whom it may concern:*

Be it known that I, J. H. DUHME, of Cincinnati, county of Hamilton, and State of Ohio, have invented an Improvement in  
5 Furnaces for Burning Coal; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

10 Figure 1 represents a perspective view, showing the exterior view of a locomotive boiler and furnace. Fig. 2 is a transverse section taken through the red lines  $x' x'$  of Fig. 3. Fig. 3 represents a longitudinal ver-  
15 tical section of the furnace showing the interior of the same.

The nature of my invention consists in the arrangement of a flue space underneath the furnace, and a second behind the furnace  
20 front, but between it and the fire; each of these flue spaces being controlled by a damper.

In the use of the several gaseous coals for burning in furnaces for the boilers of loco-  
25 motives and other engines great difficulty has been encountered in supplying the fire with the necessary amount of atmospheric air to support a free combustion of the coal and consequently to attain an economical  
30 degree of heat within the furnace. I entirely obviate this difficulty, and by a simple and cheap attachment to the furnace, which is applicable to any variety of coal burning furnace, I place the control of the  
35 amount of draft requisite to supply the furnace, in the hands of the engineer, and bring the fresh air under and in direct contact with the lower part of the fire, and carry it up in front of the fire and pass it up through  
40 the whole body of the coal contained within the furnace, if necessary.

One of the objects gained by my devices is, to make use of air for supplying the combustion which air has been previously heat-  
45 ed. This is less necessary for the air which passes through the grates underneath and throughout (A) space. But it is more particularly necessary when the air is fed into the fire through the A' space, and thence  
50 through the holes in plate (C) as seen in

Fig. 2. These holes are made to supply air at nearly a red heat, to burn up the smoke and vapors that escape unburned from the top of the fuel within the furnace, and which, if supplied with cold air entering  
55 the holes directly from outside, would not carry in heat enough to set fire to such smoke and vapor. In case however of fuel containing little or no combustible vapor, or where less heat is required than usual, the A' 60  
space is closed up by a damper H, and air is only supplied through the grates underneath the fire, and flue A is also controlled by a damper, G.

It is not deemed necessary to give a de- 65  
tailed description of either of the flue spaces A, A', as they are sufficiently indicated in the drawings in Figs. 3 and 2, where the former shows the width of the flue spaces and how the perforate plate C, after ascend- 70  
ing to the usual height of the fuel is bent over in front and riveted to the bottom part of the plate of the door D. Fig. 2, shows the front of plate C, with the perforations  $c, c, c$ . The plate, C, is constantly maintained at a 75  
red heat, so that the air allowed to pass through must be heated almost to the same temperature, having had its temperature considerably raised by passing through A, and still more along A', by the time it 80  
reaches the small holes  $c, c$ , it is hot enough to set fire to any combustible with which it may come in contact.

It is well known that in the combustion of bituminous coals in close furnaces a larger 85  
amount of smoke and combustible vapor pass off unburned, and even when cold air is admitted through the furnace front a considerable portion of the combustible vapor passes off unburned under the best management. 90

What I claim as my invention and desire to secure by Letters Patent is,

The arrangement of the flue spaces A, A', controlled by dampers H and G, for the purpose of increasing and perfecting the com- 95  
bustion substantially as set forth.

JOHN H. DUHME.

Witnesses:

R. S. CAMPBELL,  
H. E. CLIFTON.