

B. R. HAWLEY.

Improvement in Brick-Kilns.

No. 129,558.

Patented July 16, 1872.

Fig. 1.

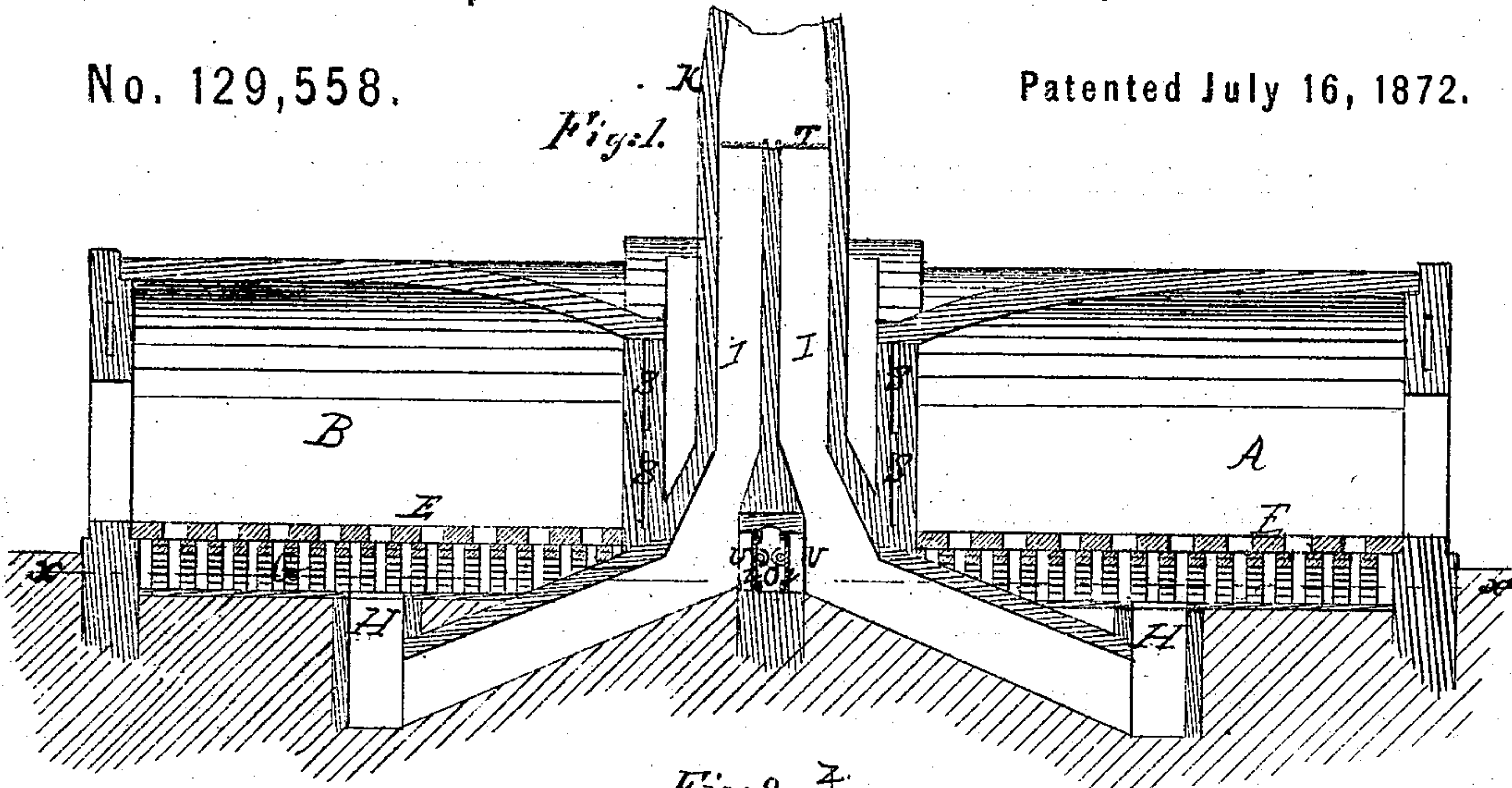


Fig. 2.

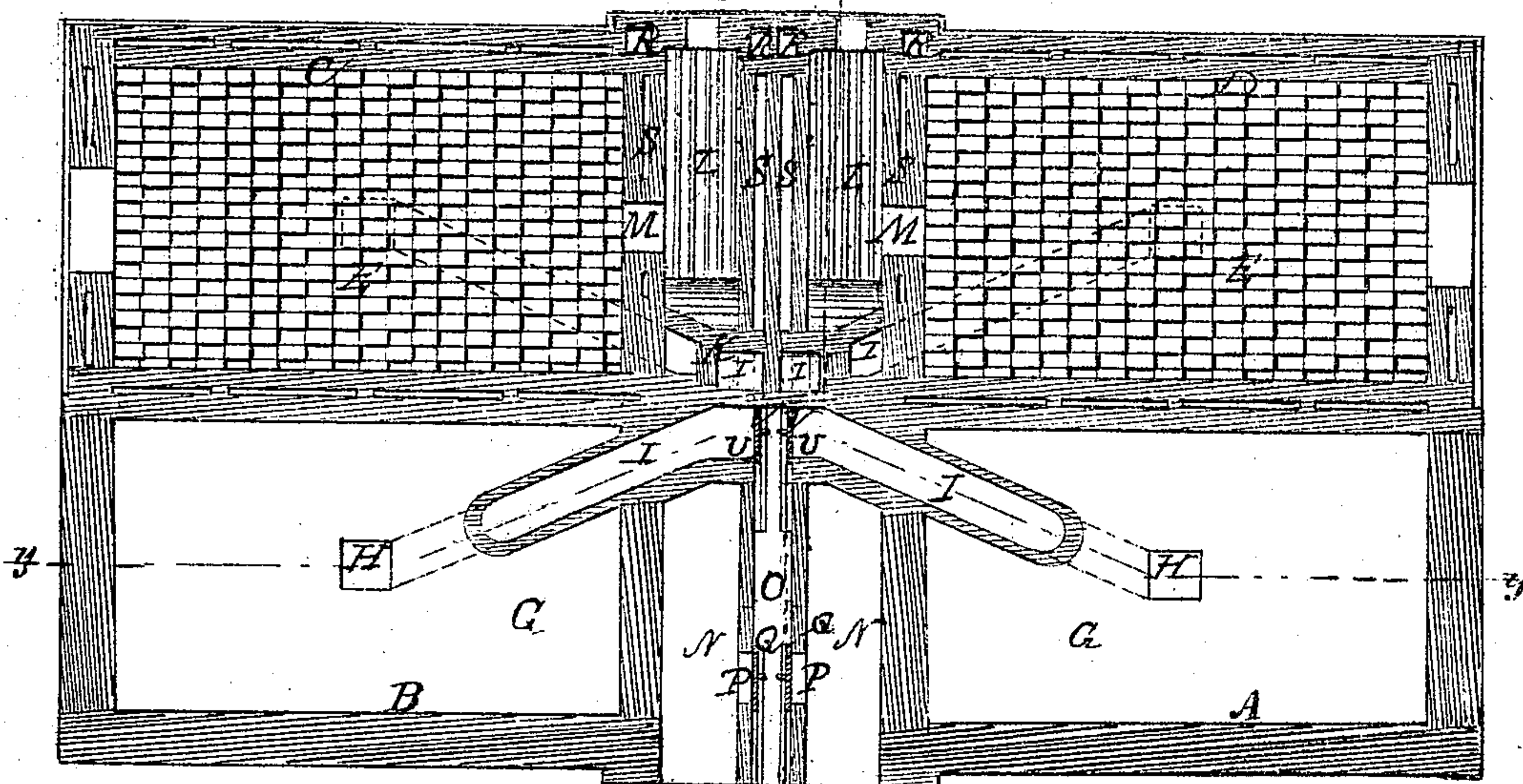
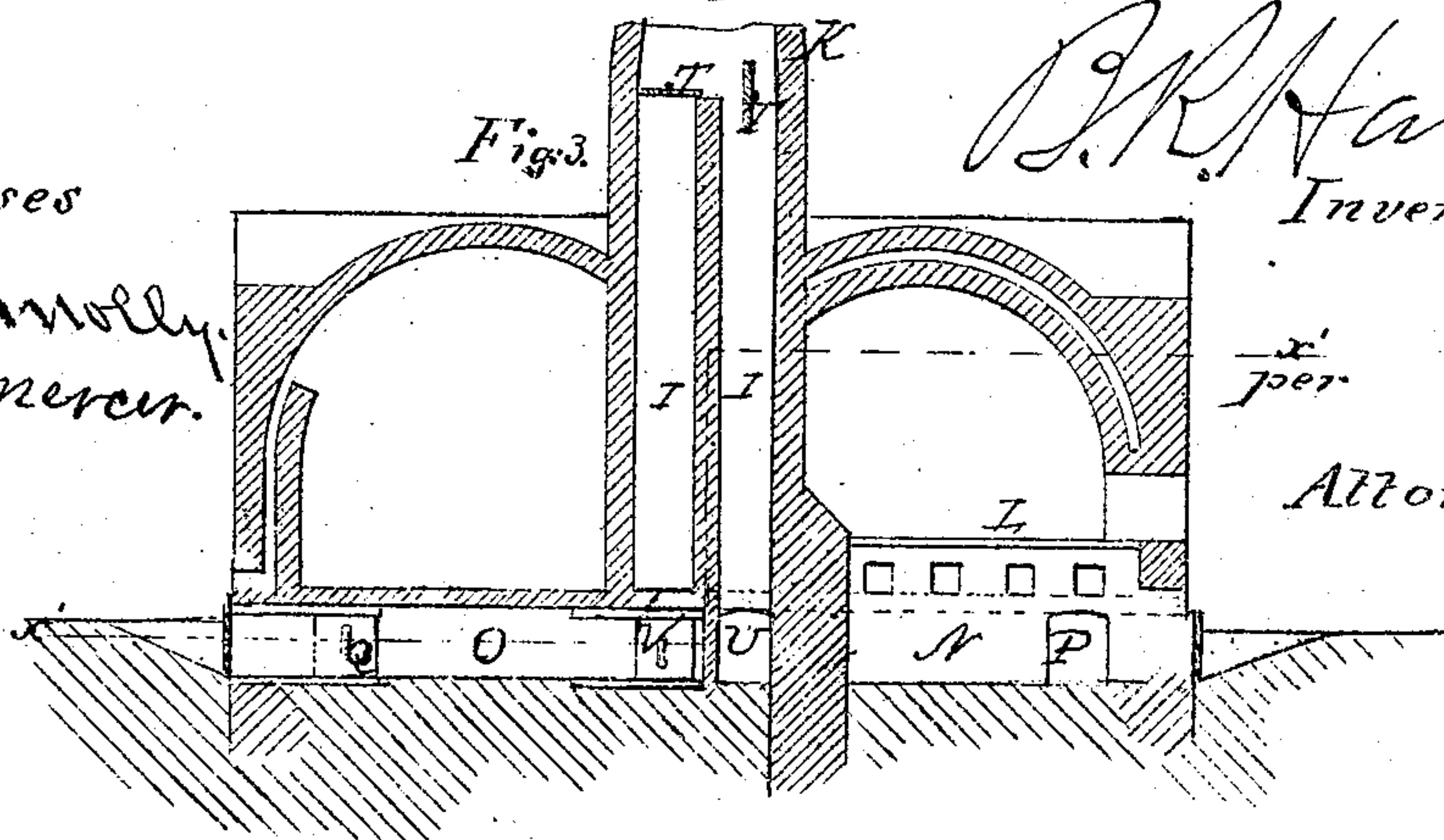


Fig. 3.



Witnesses  
J. C. Bonnelly.  
Thos. S. Mercer.

B. R. Hawley  
Inventor

J. C. Bonnelly  
Attorney



# UNITED STATES PATENT OFFICE.

BENJAMIN R. HAWLEY, OF NORMAL, ILLINOIS.

## IMPROVEMENT IN BRICK-KILNS.

Specification forming part of Letters Patent No. 129,558, dated July 16, 1872.

Specification describing certain new and useful Improvements in Kilns for Burning Bricks, Tile, Pottery, &c., invented by BENJAMIN R. HAWLEY, of Normal, McLean county and State of Illinois.

This invention relates to that class of kilns for burning bricks, tile, &c., in which the heat is discharged from the furnace into the top of the chamber containing the articles to be burned, and passes downward along said articles and through the floor to a flue or chamber below, from which it escapes to the chimney; and said invention consists of an arrangement of passages, whereby, instead of having the heat escape from said chambers under the floor to the chimney, it may be conducted from one compartment or burning-chamber of a group, both when burning and cooling off after burning, to any other compartment from the aforesaid flues or chambers below the floor, passing through the furnace of the burning-chamber to which it flows, while the air continues to flow into the first burning-chamber, whether burning or cooling off after burning, through its furnace, so that from the time of first admitting heat to a burning-chamber at the beginning of the burning, or drying previously to burning, till the bricks are completely burned and cooled, the flow of heat and air into said chamber will be continuous and in the same direction; and at the same time the currents escaping from it into the chamber below will as continuously flow into another chamber for heating and preparing the bricks for burning until said chamber is fired up, and then into its furnace to be used as a hot blast for supplying the fire as long as any heat remains in the cooling-chamber, and thus utilize the whole of the heat escaping from the cooling-chamber.

When the first burning-chamber has been completely cooled, so that the fire for the next one will no longer be benefited by having this air from the first pass through it, the passage through the latter will be stopped, and the special draught-passages for the burning-furnace will be opened, and then the currents escaping from the second burning-chamber will, after the water smoke has passed off through the chimney, which results about the time the first burning-chamber has cooled, be turned into the third burning-chamber through

its furnace in the same manner as before stated in regard to the second burning-chamber, and so on continuously, utilizing all the available heat escaping from one burning-chamber in the next one to be burned, and cooling off the last one burned by air flowing in the same direction, and following up the heat used in burning through the hot furnace, so as to be tempered by the remaining heat of the furnace before coming to the bricks, to avoid the damaging effects of cold air admitted directly upon the hot bricks, which chills them too quickly, and cracks and checks them so as to greatly reduce their market value.

By this plan I do not have to reverse the currents through the burned chamber for cooling, as heretofore, taking the cold air into the chambers under the floors, and up through the bricks into the furnace; and I avoid, thereby, the unequal action that was produced on the bricks by so reversing the currents, and have instead the most equal and perfect action, for now the heat first lodged in the upper tiers of bricks is, when the cooling process begins, taken back by the cold air, and conveyed down along the lower tiers, so that the exposure is alike throughout; whereas, when the currents were reversed, after the lower tiers had been heated to the same degree that the upper ones had been, their heat was taken back by the cooling currents and conveyed along the upper tiers again, thus exposing the upper tiers to heat a greater length of time than the lower ones, and the lower tiers were more exposed to the cold air in cooling off.

This plan of cooling off the burned bricks is relieved of any damaging effect of cold air upon the bricks, and thereby rendered practically successful by using, in connection with it, the arrangement of furnaces heretofore described by me in my patents, No. 118,364, 125,292, and others, for conducting the air up over the arch-walls of the furnaces before having it enter the fire, so that at the beginning of the cooling operation, while the bricks are so hot that cold air directly admitted would crack and spoil them, there will be a sufficient quantity of remaining heat in the passages leading to the furnaces and in said furnaces to so temper the air, although flowing to the full extent admitted by the passages, which are large, that it cannot crack the bricks or cool them too fast;



but I do not limit myself to the use of such furnaces with my present improvement, for it is available with any furnace that will temper the air sufficiently before coming in contact with the bricks, however it may be arranged.

Figure 1 is a longitudinal sectional elevation of a kiln in a group of four burning-chambers constructed according to my present improvement, the section being taken on the line *yy* of Fig. 2. Fig. 2 is a horizontal section taken on the lines *xx'* of Fig. 1 and *xx'* of Fig. 3, and Fig. 3 is a transverse sectional elevation taken on the line *zz* of Fig. 2.

In this example I have chosen a kiln with a series of burning compartments or chambers, constructed and grouped as represented in my before-mentioned patents, to represent the application of my present improvements to kilns of that character; but its application is not limited to any particular arrangement or mode of grouping a series of burning-chambers, as I shall show.

A, B, C, and D represent the four burning-chambers of the group. E represents the perforated floors; G, the chambers under the floors; H, the wells below; I, passages therefrom to the chimney K; L, the furnaces; M, passages from the furnaces to the burning-chambers; N, chambers under the furnaces; O, a duct or passage extending from the furnaces of one side of the group to those of the other side, and connecting the chambers N below them by the passages or openings P with dampers Q; and R represents the draught-passages for admitting cold air for the support of combustion to the arches over the furnaces, not shown, and down along the side walls of the furnaces through passages S to the fire, all being the same as represented in the afore-said patents.

With this arrangement the currents escaping into the chambers G through the bricks and the perforated floors while burning pass therefrom through H and I into the chimney K and escape; but when the burning is completed, and it is no longer required to have the heat pass from the furnaces into the burning-chambers, the currents are reversed and caused to flow from the burned compartments, down through the furnace to the chamber N, through P and O, into the next burning-chamber, where the articles are to be burned—say, from A to B—by closing the dampers T in the chimney, opening dampers Q, and opening passages (not shown) for the cold air to enter the chamber G below the floor E of the burned chamber, to rise up through the bricks and carry the heat therefrom to the next chamber to be burned, and heat the bricks therein, and to supply the furnace with hot air after the said currents become too cold to be admitted to the bricks.

Now, in order to avoid this reversal of the currents and the objections belonging thereto, as before described, also to conduct the waste

heat from a burning-chamber to the next one to be burned before the completion of the chamber being burned, I connect each flue I with the cross-duct O by a suitable passage, U, with an appropriate damper, V, and thus discharge the currents from the burning-chamber into said duct, to be conducted to any other burning-chamber through the furnace thereof, the damper T of the flue I of the burning-chamber being closed and its damper V opened; also the damper Q of the passage P leading from duct O to the furnace of the next chamber to be burned is opened.

Thus I have an arrangement by which the air and heat flow from the beginning of the burning, and throughout the burning and cooling, in a continuous round or circle in the same direction, discharging into the next burning-chamber or its furnace, and the same in succession through all the series, beginning a new chamber as soon as one is cooled, always having the process in operation in two chambers.

The plan here employed with a series of burning-chambers arranged in a single row side by side, as at A D or B C of the group shown in this example, may be applied to any series, however grouped, the furnaces being arranged one between each two adjacent chambers, with a duct, O, extending along under the chambers, and connecting by suitable passages with each chamber N under the furnaces, and another duct will be provided alongside of it, discharging into the chimney at one end, with each passage I connecting with it, also connecting with said duct O, there being appropriate dampers at all the connections. This arrangement is analogous in all respects with the one herein shown for the particular arrangement of the group represented in the drawing.

Other needful modifications for adapting the said plan to chambers otherwise grouped will be readily understood from the foregoing description.

I claim as my invention—

1. In a group of burning-chambers, wherein the heat passes from the top down through the floor to a flue or chamber below, the connection of such flues or chambers below with a duct or passage, O, having a connection with all the furnaces of a group.

2. Also, the connection of said furnaces with the draught-chimney in such manner that the currents from one burning-chamber, whether burning or cooling off, may be conducted to any other chamber through its furnace, the said currents being conducted through the burning-chambers in the same direction throughout the burning and cooling, substantially as specified.

B. R. HAWLEY.

Witnesses:

T. C. CONNOLLY,  
THOS. S. MERCER.