

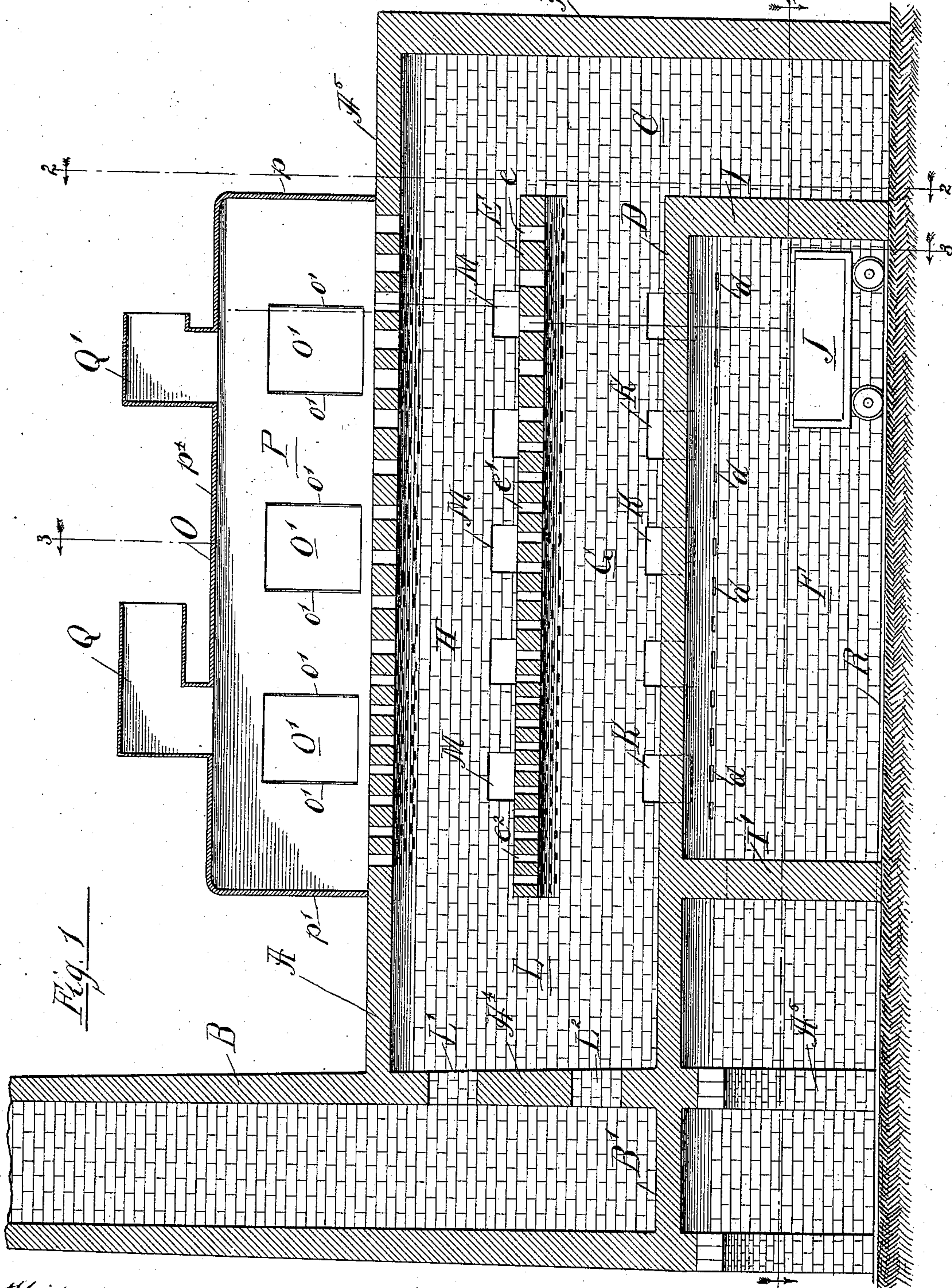
(No Model.)

3 Sheets—Sheet 1.

E. DE LA CHAPELLE & J. PEARCE.
GARBAGE FURNACE.

No. 577,184.

Patented Feb. 16, 1897.



Witnesses
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(No Model.)

3 Sheets—Sheet 2.

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Fig. 2

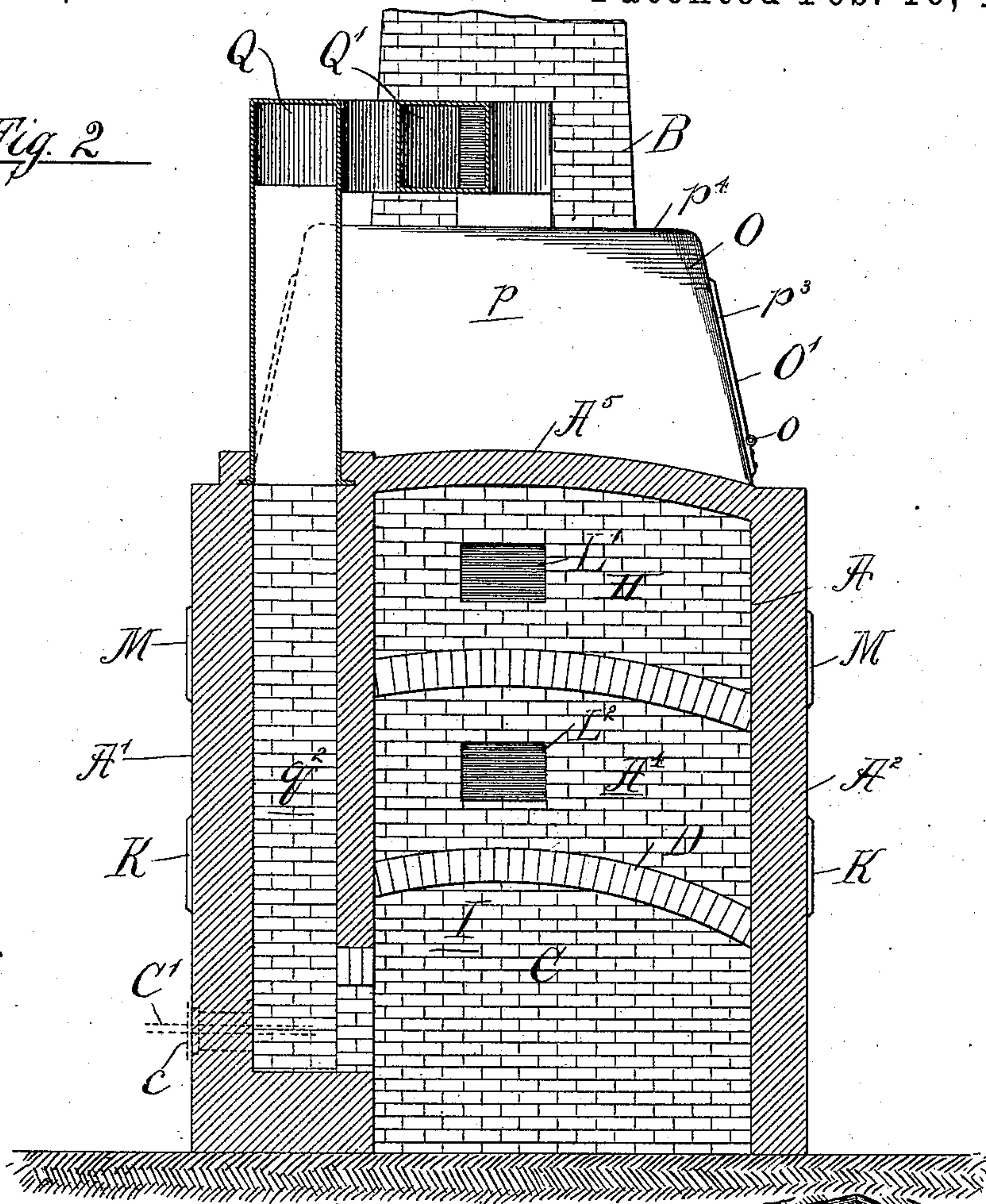
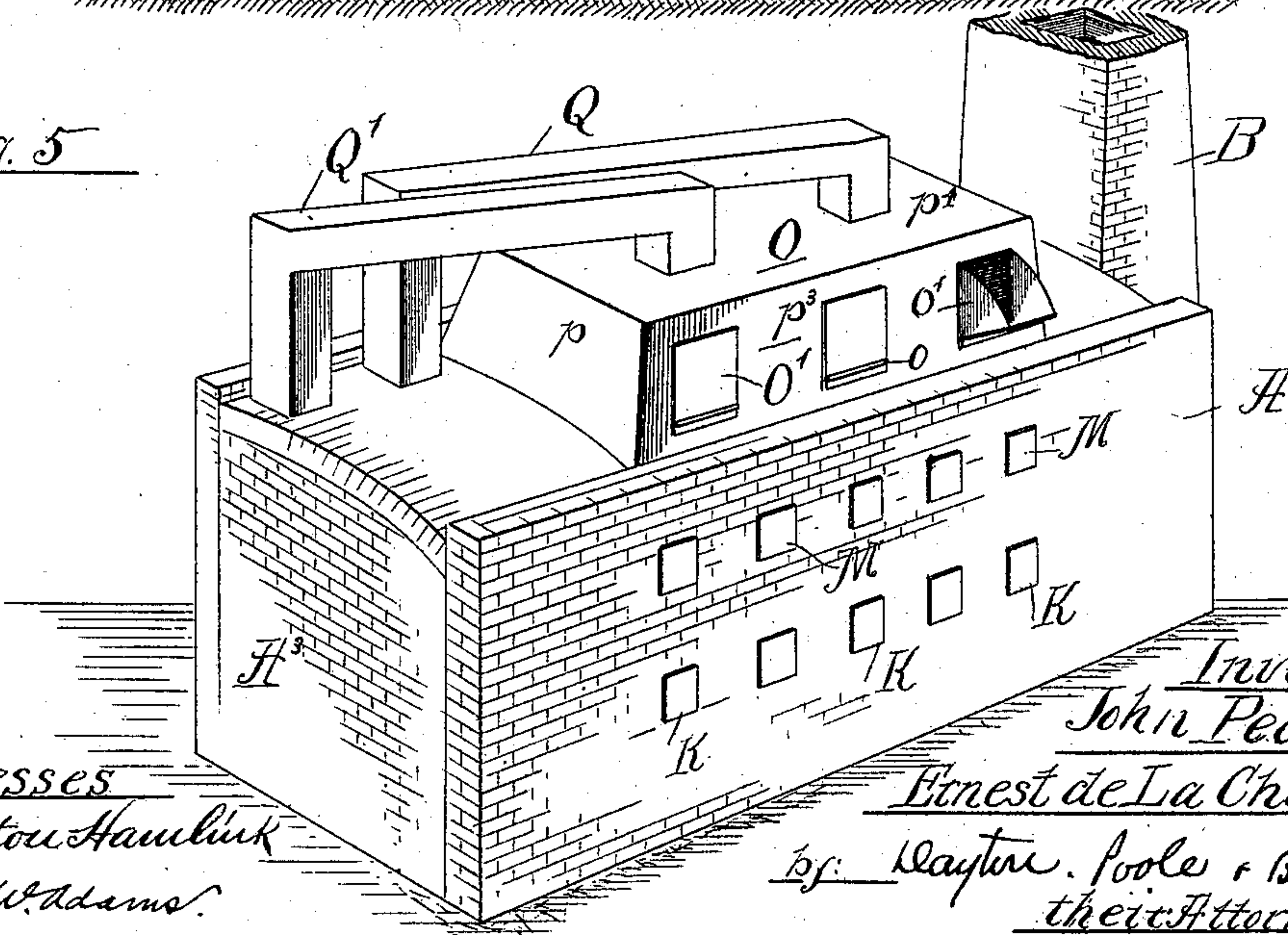


Fig. 5



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Fig 3

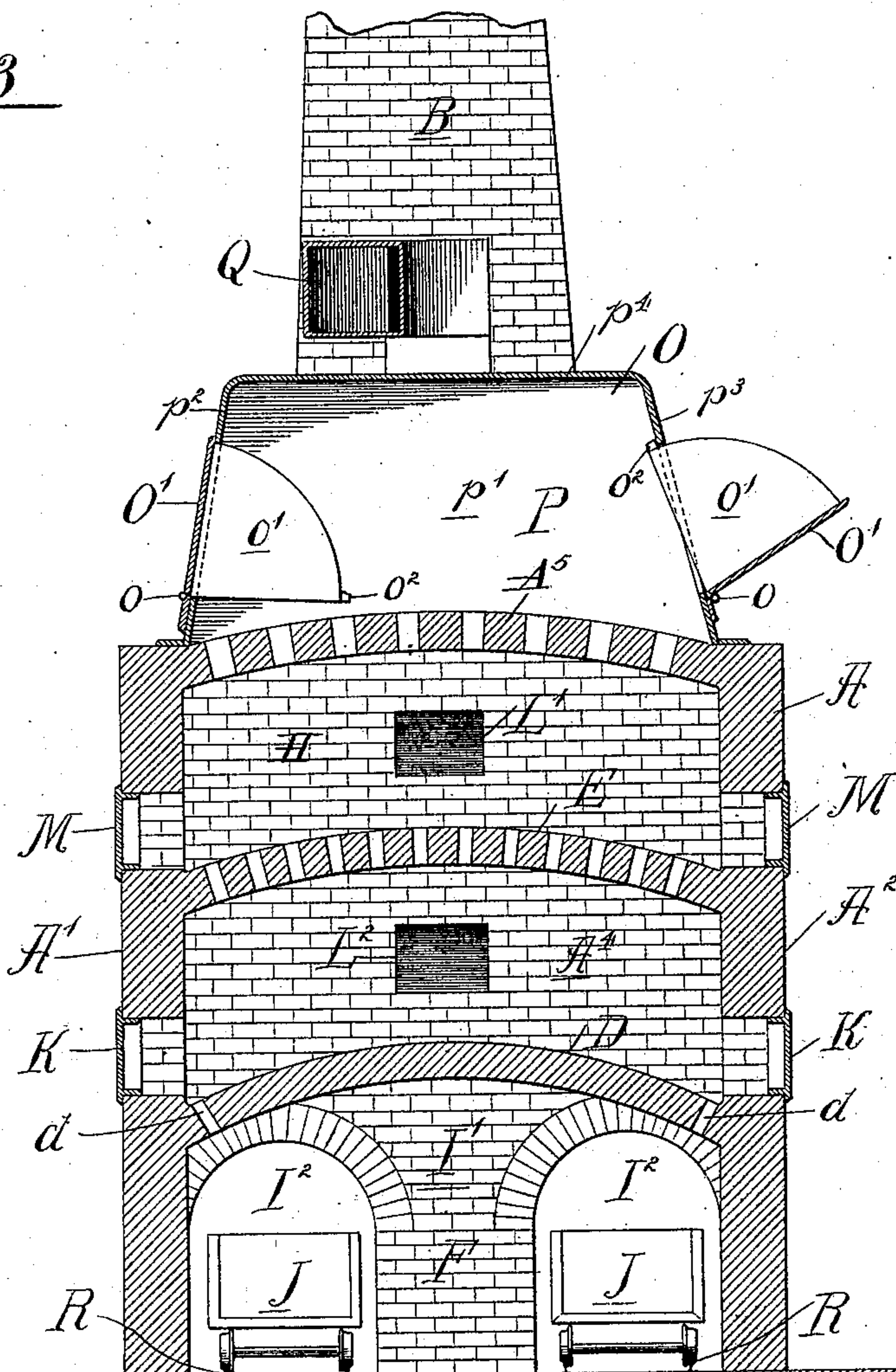
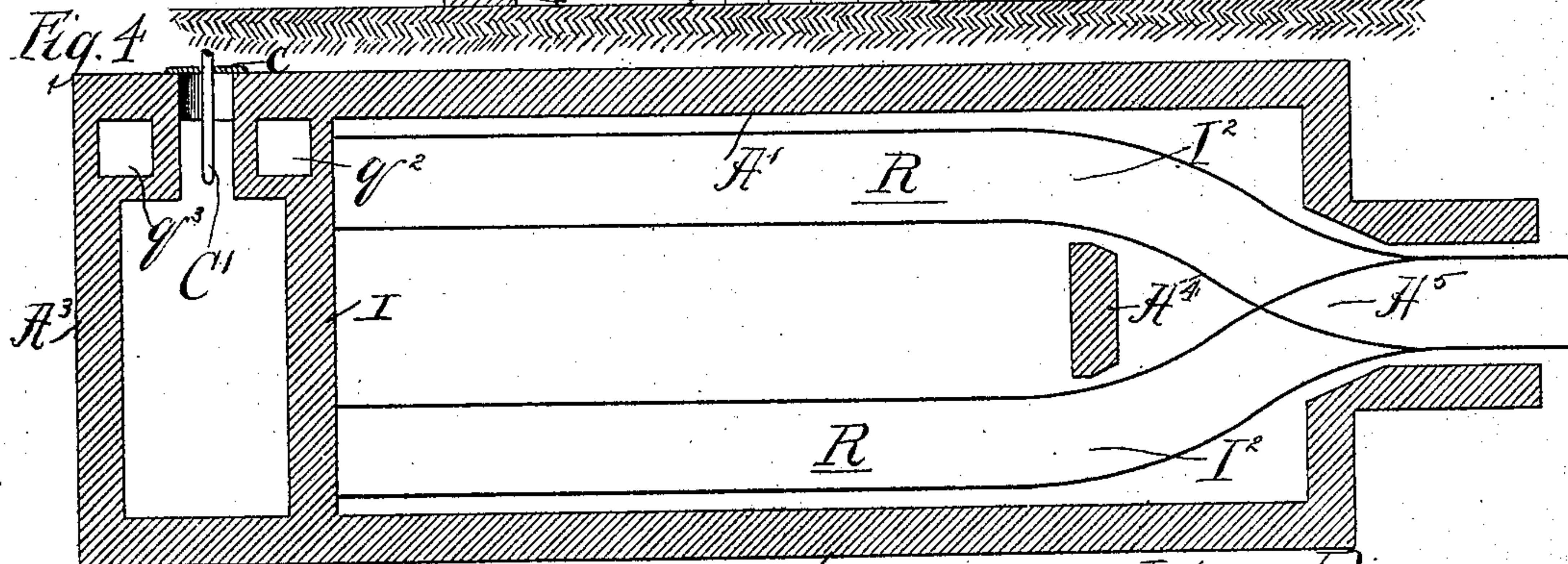


Fig. 4



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UNITED STATES PATENT OFFICE.

ERNEST DE LA CHAPELLE AND JOHN PEARCE, OF OTTAWA, ILLINOIS.

GARBAGE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 577,184, dated February 16, 1897.

Application filed December 28, 1895. Serial No. 573,660. (No model.)

To all whom it may concern:

Be it known that we, ERNEST DE LA CHAPELLE and JOHN PEARCE, of Ottawa, in the county of La Salle and State of Illinois, have invented certain new and useful Improvements in Garbage - Furnaces; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in garbage-burning furnaces and refers more specifically to an improved furnace provided, in addition to the combustion-space within which the garbage is burned, with a closed garbage-drying chamber wherein the garbage is dried preparatory to the burning of the same, and which chamber is provided with eduction-flues by means of which the gas and vapors evolved during the drying of the garbage are conducted to the interior of the furnace.

The object of the invention is to provide a furnace of the character referred to of exceedingly practical and economical construction, which is capable of burning large quantities of garbage without permitting the escape of any of the noxious gases or odors arising therefrom, and in which the work of feeding the furnace and removing the residue may be carried on continuously and is reduced to a minimum.

The invention consists in the matters hereinafter described and more particularly pointed out in the appended claims, and the same will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a central vertical longitudinal sectional view of a furnace embodying our invention. Figs. 2 and 3 are transverse vertical sectional views taken on lines 2 2 and 3 3, respectively, of Fig. 1. Fig. 4 is a horizontal sectional view taken on line 4 4 of Fig. 1. Fig. 5 is a perspective view of the furnace.

Referring to the drawings, A designates as a whole the main furnace, shown in this instance as of oblong rectangular form and comprising vertical side and end walls A' A² and A³ A⁴, respectively, and a crowning or arched top wall A⁵. A chimney B, of usual

construction, is located centrally at one end of the furnace, conveniently built externally to the main body of the furnace.

C designates the fire-box, which in the present instance occupies practically one entire end portion of the main furnace, for convenience of description hereinafter designated the "front end."

The furnace is herein shown as equipped to burn fuel supplied in the form of gas, the gas being supplied under pressure to the fire-box through a suitable burner C', which is arranged to project into the said fire-box at one side thereof through an inlet-opening c, as indicated clearly in Figs. 2 and 4. The remainder of the interior of the furnace, other than that occupied by the fire-box, is divided by means of two horizontal longitudinally-extending arches D E, arranged at points approximately equidistant from each other and from the ground-floor and top wall of the furnace, respectively, into three chambers—a lower ash-chamber F, a lower combustion-chamber G, and an upper combustion-chamber H. The lower arch D is supported at its rear end by means of the end wall A⁴ of the furnace, while its front end is supported by means of a transversely-arranged wall I, which forms the rear wall of the lower part of the fire-box C. A second transverse supporting-wall I' is provided intermediate of the length of the said arch D, this latter wall being provided adjacent to each of the side walls of the furnace with arched doorways I² I³ (see Fig. 3) for the passage of ash conveyers or cars J J.

The arch D constitutes the floor of the lower combustion-chamber G, and in order that the ashes and refuse collected thereon may pass through to the ash-chamber beneath and be collected in the cars J said arch is provided along each side adjacent to the side walls of the furnace with a series of ash-holes d d, through which the ashes may be raked and directed into the cars beneath. Access to the lower combustion-chamber G for the purpose of thus raking the ashes into the ash-hole is provided by means of a series of doors K K, arranged at suitable intervals apart in the side walls A' A².

The arch E, which constitutes the separating-partition between the upper and lower

combustion-chambers II and G, is constructed of fire-brick or other refractory material capable of withstanding intense heat, and extends at its front end coincident with the end of the arch D, and terminates at its rear end some distance short of the rear end wall A⁴ of the furnace, thereby forming an open space L wherein the flames and products of combustion from both combustion-chambers may freely intermingle. From this intermingling space centrally-located exit-openings L' L² lead through the rear wall of the furnace into the chimney B. The arch E is provided with numerous perforations *e e' e²* or made of open construction, so that the garbage is subjected to the action of the flames from both above and below. Preferably, and as shown in the present instance, the arch will be divided into sections, each of which has perforations of different sizes to accommodate garbage of different character and degrees of coarseness. A second series of doors M M, similar to the doors K, afford access to the upper combustion-chamber II, so that the garbage may be stoked or stirred to facilitate its consumption and to keep the apertures of the grated arch clear. That part of the top arch of the furnace which extends above the perforated arch E is also provided with apertures or of open construction and divided into sections arranged to register with those of the arch E, having perforations of different sizes. The perforations of each section of the top arch are, however, made relatively larger than those of the section immediately beneath. Thus the section located nearest the front of the furnace, and which is preferably provided with the largest perforations, may be made of six inches diameter, and those of the section immediately beneath it of four inches diameter, while the middle section of the top wall may be provided with perforations of four inches diameter and those of the section immediately beneath it may be provided with perforations of three inches diameter.

O designates a housing arranged to cover and completely inclose the entire perforated part of the top arch of the furnace, said inclosure constituting a drying-chamber P, within which the garbage is dried previous to its entrance to the furnace proper. Said housing O is conveniently made of sheet metal, comprising vertical end walls *p p'*, upwardly-converging or tapered side walls *p² p³*, and a horizontal top wall *p⁴*. Along each side wall is provided a series of doors O' O', through which the garbage may be passed into the said drying-chamber. These doors O' may be made of any desired construction, but are preferably hinged at their lower edges, as at *o*, exteriorly to the chamber, so as to open outwardly. The side margins of each door are provided with segmental-shaped rings *o' o'*, which extend through the door-openings when the doors are closed, and when the doors are opened form, in conjunction with the latter, a chute or hopper to direct the garbage

into the said drying-chamber. Suitable stops *o²* upon the inner upper corners of said wings serve to limit the extent to which the doors may open by contact with the upper margin of the door-opening, and thus support the hopper in proper position.

In order that the gases and steam driven off during the drying of the garbage may be collected and carried to the fire-chamber of the furnace, flues Q Q' are arranged to communicate with the upper part of the chamber P, said flues being preferably so located at points centrally of and intermediate the length of said chamber as to draw uniformly from the entire area of the inclosure. The flues Q Q' lead forwardly to and communicate with the upper ends of vertically-arranged flues or passages *q² q³*, built in or otherwise provided within that side of the fire-box C through which the fuel-nozzle C' enters the said chamber. The lower ends of said vertical flues *q² q³* open into the said fire-box at each side of and slightly below said fuel-nozzle, so that the gases and heated air drawn through the flues are delivered directly to the jet issuing from the nozzle.

It may be noted in this connection that the entire supply of air for combustion is drawn from the drying-chamber P, thus insuring a strong indraft through the doors of said chamber which effectually prevents the escape of noxious gases and odors when the doors are opened for feeding in the garbage. It may also be noted that the gases and air drawn from said drying-chamber will be highly heated and will therefore aid the combustion within the fire-box.

The ash conveyers or cars J J are conveniently arranged to run upon tracks R R, laid upon the floor of the ash-chamber along each side thereof throughout the principal length of the furnace, but arranged to converge together at the rear end thereof, so as to pass out through an arch-opening A⁵, formed in the end wall of the furnace and centrally between the foundation-walls of the chamber. (See Fig. 4.) A horizontal partition or wall B', extending across the chimney-throat at the level of the lower arch D, forms the bottom of the chimney proper.

The operation of the furnace thus constructed may be briefly described as follows: Gas supplied under pressure to the burner C' is ignited and practically fills the entire fire-box and combustion-chambers of the furnace. The garbage is now fed through the doors O' into the drying-chamber, care being exercised to feed the coarser garbage through the doors opposite the sections having the largest perforations. The heat arising from the upper combustion-chamber through the perforations in the top wall of the furnace, and also that transmitted through the wall itself, rapidly dries the garbage, thus at the same time driving off the moisture and greatly reducing it in bulk, so that it readily passes down through said perforated top arch to the

perforated arch beneath. Here it is subjected to the direct action of the flames from both above and below said arch and is thus rapidly consumed, the ashes and residue passing down through the arch to the floor of the combustion-chamber, from whence they may be removed in the manner hereinbefore described.

A furnace constructed in accordance with our invention possesses important advantages. The construction is such that the interior of the furnace may be raised to a temperature high enough to reduce very refractory substances, such, for instance, as cast-iron, and even broken pottery is rendered so soft as to readily pass through the arches to the floor of the combustion-chamber without injury to any part of the furnace. This is a feature of much importance, inasmuch as garbage usually contains more or less of such refractory material and the temperature commonly employed in such furnaces is as high as that used in glass-melting furnaces. Furthermore, the arrangement is such that the operation of the furnace at its full capacity may be continued without interruption indefinitely and with the expenditure of a minimum amount of manual labor. The construction as a whole is also exceedingly simple, practical, and cheap and capable of the maximum endurance, as the parts exposed to the intense heat incident to the incineration of garbage are constructed entirely of highly-refractory material, while at the same time they are so constructed and arranged as to produce a most efficient draft and to insure a continuous feeding of the furnace.

We claim as our invention—

1. A garbage-furnace comprising an inclosure, a fire-box occupying one end of the inclosure, a horizontal combustion-chamber connected at one end with the fire-box, a compartment extending over the combustion-chamber, forming a drying-chamber having lateral openings for the introduction of waste materials, said combustion-chamber having an apertured, fire-brick top arch, the top of which is horizontal and forms the floor of the drying-chamber, a stack or chimney communicating with the end of the combustion-chamber remote from the fire-box, a flue leading from the top of the drying-chamber to the combustion-space of the fire-box, and means for supplying fuel to said fire-box, substantially as described.

2. A garbage-furnace comprising a fire-box, a plurality of horizontal combustion-chambers each connected at one end with the fire-box, and separated from each other by an apertured fire-brick arch or arches, a stack or chimney communicating with the ends of the combustion-chambers remote from the fire-box, an inclosure forming a drying-chamber extending over the upper combustion-chamber, the top arch of the upper combustion-chamber which forms the floor of the drying-chamber being perforated or of open construction, a flue leading from the said drying-

chamber back to the fire-box, and means for supplying fuel to the fire-box, substantially as described.

3. A garbage-furnace comprising a fire-box, a plurality of horizontally-extending combustion-chambers which communicate at one end with the fire-box, and separated from each other by a fire-brick arch or arches of perforated or open construction, a stack or chimney, a compartment or chamber located between the said combustion-chambers and the stack, in open communication with said stack and with said combustion-chambers, an inclosure forming a drying-chamber extending over the upper combustion-chamber, the portion of the top arch of the furnace which constitutes the floor of the drying-chamber, being perforated, a flue leading from the top of the drying-chamber back to the fire-box, and means for supplying fuel to the fire-box, substantially as described.

4. A garbage-furnace comprising a fire-box, a plurality of horizontally-extending combustion-chambers which communicate at one end with the fire-box, and separated from each other by a fire-brick arch or arches of perforated or open construction, a stack or chimney, an inclosure forming a drying-chamber extending over the upper combustion-chamber, the portion of the top arch of the furnace which constitutes the floor of the drying-chamber, being perforated and having the perforations of different sizes in different parts of said floor, a flue leading from the top of the drying-chamber back to the fire-box, and means for supplying fuel to the fire-box, substantially as described.

5. A garbage-furnace comprising a fire-box, a plurality of horizontally-extending combustion-chambers, each communicating at one end with the fire-box; a stack or chimney communicating with the ends of the combustion-chambers remote from the fire-box end, said combustion-chambers being separated by an apertured partition, an inclosure forming a drying-chamber extending over the upper combustion-chamber, a part of the top arch of the uppermost combustion-chamber, which forms the floor of said drying-chamber being perforated or of open construction, a burner discharging into the fire-box, and a flue leading from said drying-chamber to the fire-box at the rear of the burner, substantially as described.

6. A garbage-furnace comprising a main inclosure, a fire-box occupying one end thereof, a fuel-burner arranged to extend within said fire-box at the lower part thereof, a plurality of horizontally-extending combustion-chambers, each communicating at one end with the fire-box, a stack or chimney communicating with the said chambers at their ends remote from the fire-box, said combustion-chambers being separated by a horizontal apertured partition, which terminates short of the chimney, the top arch of the upper combustion-chamber being also perfo-

rated, an inclosure extending over said perforated top arch and forming a drying-chamber, two upright stacks or flues, located one at each side of the burner, and two flues leading from the top of said drying-chamber to the said upright flues, substantially as described.

7. A garbage-furnace comprising a main inclosure of generally rectangular form, a fire-box occupying one end thereof, an ash-chamber occupying the lower part of said inclosure, two horizontally-extending combustion-chambers located one above the other, each communicating at one end with the fire-box, and separated from each other by a horizontal, apertured partition, the upper one of said chambers having a perforated top arch, a horizontal partition forming the floor of the lower combustion-chamber and separating the latter from the ash-chamber, said floor being provided with a series of ash-holes extending therethrough, doors extending through the walls of the furnace and communicating with the said combustion-chambers, a housing forming a drying-chamber extending over the said top arch of the upper combustion-chamber, an eduction-flue leading from the drying-chamber to the fire-box, and means for supplying fuel to the fire-box, substantially as described.

8. A garbage-furnace comprising a main

inclosure of generally rectangular form, a fire-box occupying one end thereof, an ash-chamber occupying the lower part of said inclosure, a combustion-chamber communicating at one end with the fire-box and having a perforated top arch, a horizontal partition forming the floor of the combustion-chamber and separating the latter from the ash-chamber, said floor being provided with a series of ash-holes extending therethrough, doors extending through said walls of the furnace and communicating with the combustion-chamber, a housing forming a drying-chamber extending over said perforated top arch of the upper combustion-chamber, an eduction-flue leading from the drying-chamber to the fire-box, and means for supplying fuel to the fire-box, and car-tracks in the said ash-chamber beneath the said ash-holes in the floor of the combustion-chamber, substantially as described.

In testimony that we claim the foregoing as our invention we affix our signatures, in presence of two witnesses, this 23d day of December, A. D. 1895.

ERNEST DE LA CHAPELLE.
JOHN PEARCE.

Witnesses:

LORENZO LELAND,
EDWARD C. SWIFT.