

W. L. REYNOLDS & D. THOMAS.

PUDDLING-FURNACE.

No. 174,573.

Patented March 7, 1876.

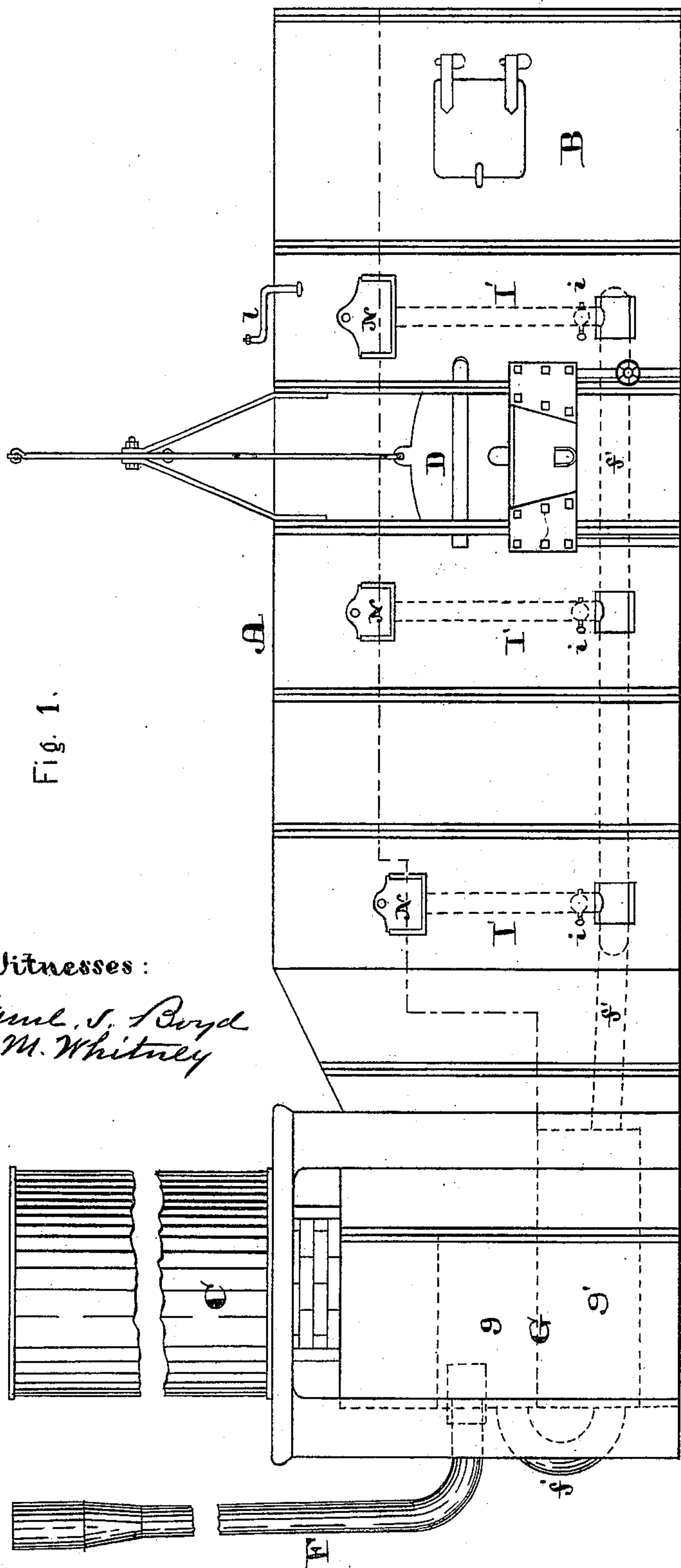


Fig. 1.

Witnesses:

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C. M. Whitney

Inventors:

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David Thomas

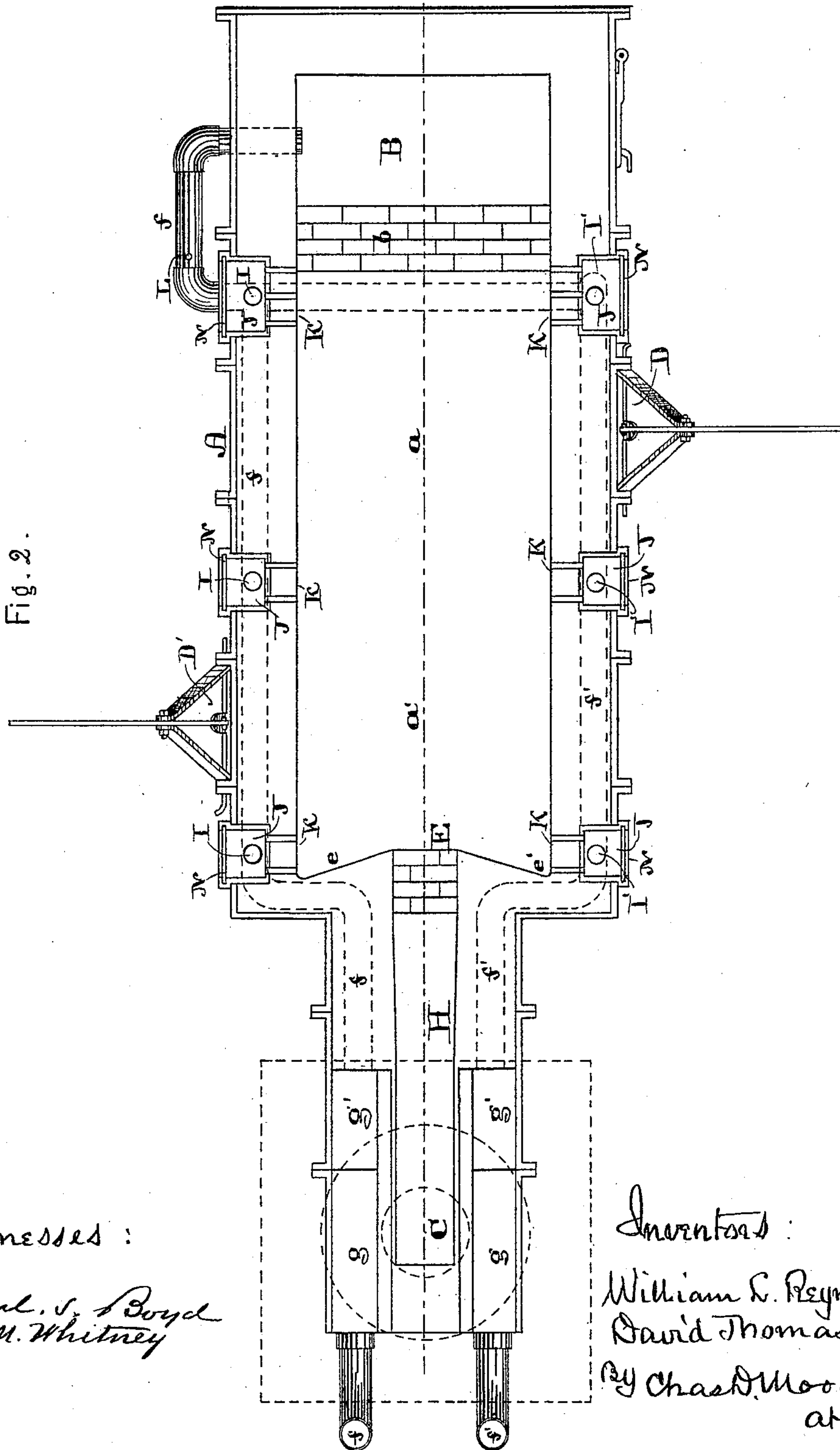
By Chas. Moody.
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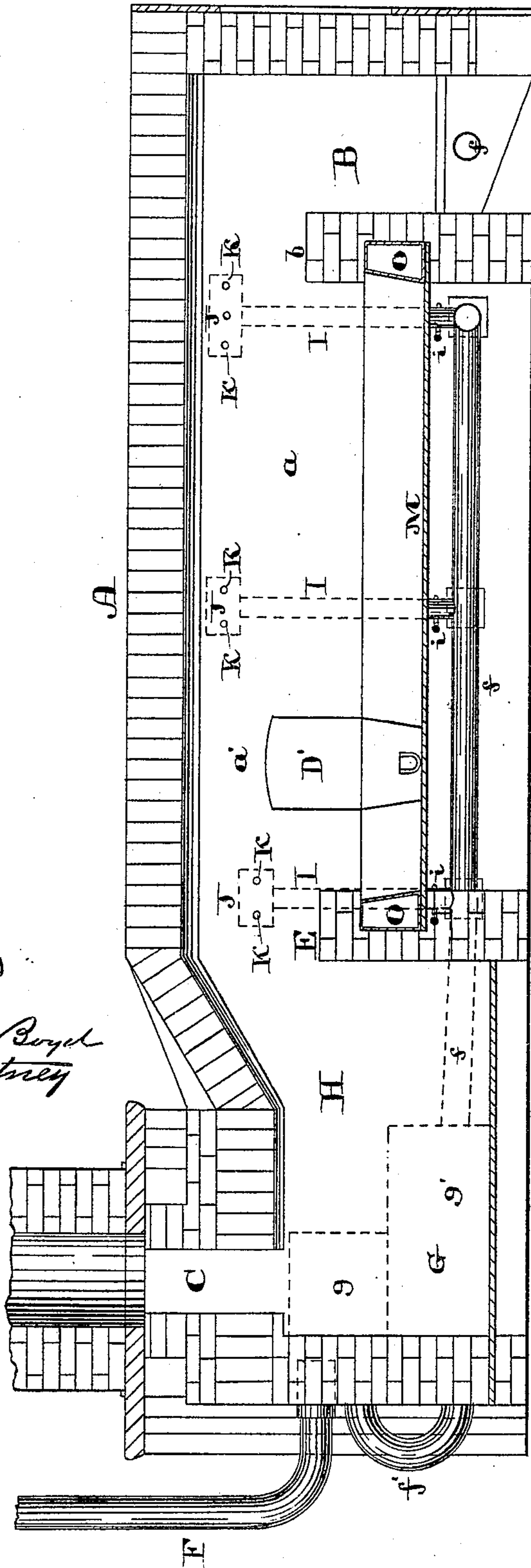
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Fig. 3.

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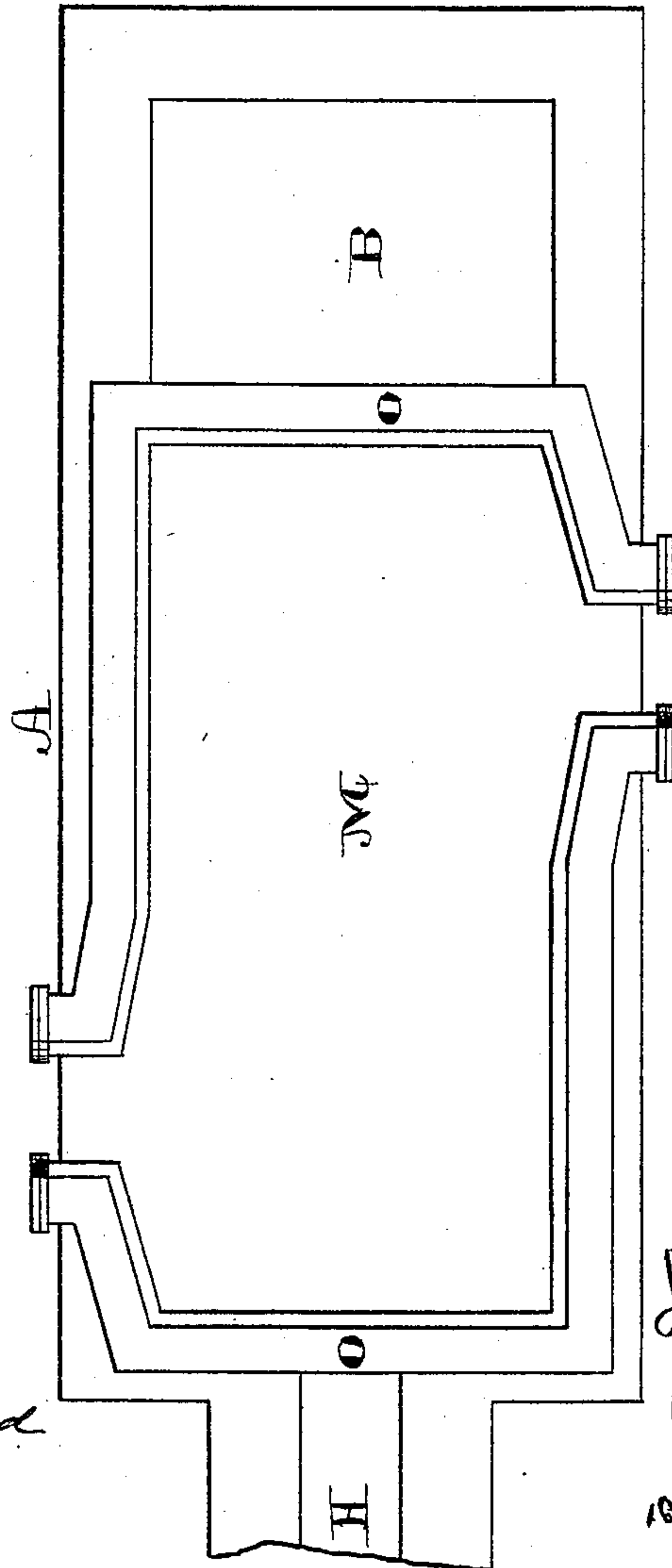
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Fig. 4.



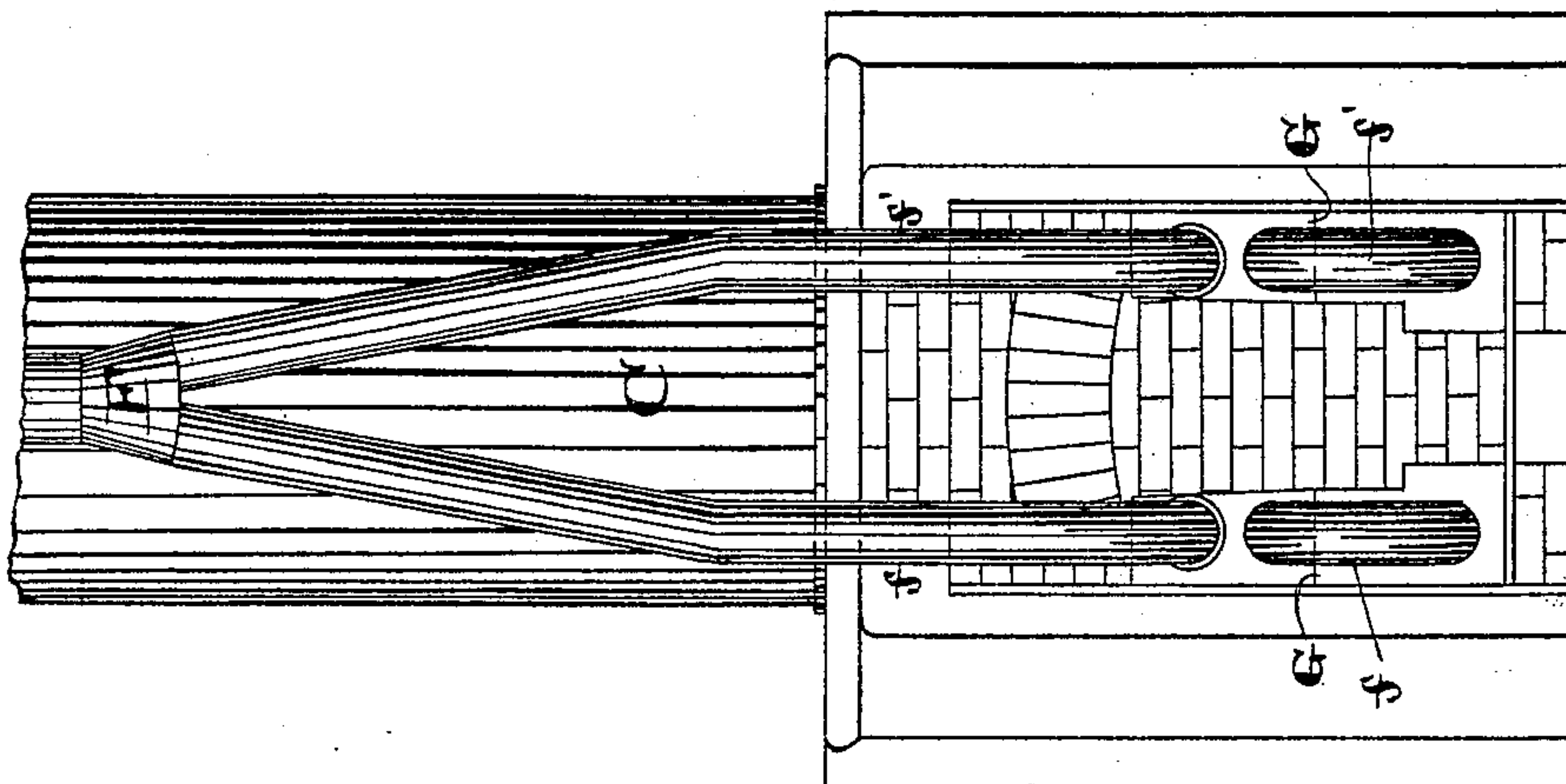
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Fig. 5.



UNITED STATES PATENT OFFICE.

WILLIAM L. REYNOLDS AND DAVID THOMAS, OF ST. LOUIS, MO., ASSIGNORS
OF ONE-THIRD THEIR RIGHT TO WILLIAM B. DEAN, OF SAME PLACE.

IMPROVEMENT IN PUDDLING-FURNACES.

Specification forming part of Letters Patent No. 174,573, dated March 7, 1876; application filed
December 1, 1875.

To all whom it may concern:

Be it known that we, WILLIAM L. REYNOLDS and DAVID THOMAS, residents of the city and county of St. Louis, State of Missouri, have invented new and useful Improvements in Puddling-Furnaces, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a side elevation of the furnace; Fig. 2, a horizontal section thereof, taken on different levels, as indicated by the dotted lines in Fig. 1; Fig. 3, a central vertical section; Fig. 4, a plan, being a detail, showing the water-boxes; and Fig. 5 an end elevation of the rear end of the furnace.

Like letters refer to like parts.

Our principal aim is to produce puddled iron more economically, and of a better quality; and to these ends the invention has relation to the construction of the puddling-chamber of the furnace. It also has reference to the heating, regulation, and introduction of the hot-air blast. It further relates to the shape of the neck of the furnace; also, to the mode of constructing the water-boxes; and to the provision whereby the openings for the entrance of the air-blast are enabled to be kept open.

Referring to the annexed drawings, A, Figs. 1, 2, and 3, represent the improved furnace, B represents the fire-place, and $a a'$ represent a double puddling-chamber—that is, a chamber wherein two different balls can be puddled at the same time; and for this purpose the furnace is made comparatively long and narrow, providing room at a , immediately beyond the bridge-wall b , where one of the puddling operations can be carried on, and at a' immediately beyond the place a , and in the direction of the chimney C, for the other puddling operation. D D represent doors arranged respectively on each side of the furnace, and respectively opposite the places a and a' . The furnace-walls are built in the usual form, saving at the rear end E, near the neck of the furnace, the walls, instead of being contracted gradually toward the neck, are carried a uniform distance apart until opposite the neck, and then, in such a direction as to form re-

entering angles $e e'$; they are carried to the furnace-neck. F, Figs. 1, 3, 5, represents an air-blast pipe, which, coming from any suitable direction, is forked in to two branches, $f f'$, before entering the furnace. These branch pipes are respectively carried into heating-boxes G G, which are located at the bottom of the chimney C, and at the end of the flue H.

We do not desire to be confined to the precise shape and construction of the boxes G G, shown. They are made double, $g g'$, to obtain a larger amount of heating-surface, but any suitable form will answer. From the heating-boxes the branch pipes $f f'$, respectively, along either side of the furnace, and as indicated by the dotted lines in Figs. 1 and 2, and as shown in Fig. 3, are conducted toward the forward end of the furnace, and to a point just beyond the bridge-wall b , where the two branches are preferably united. One of the branches f , Figs. 2, 3, is then carried out through the furnace-wall, and thence along the same until opposite the ash-pit, where it is taken into the furnace again, and so as to open into the ash-pit beneath the fire-place B. I I I' I' I' represent additional branch pipes leading upward from the branches $f f'$, and arranged as follows—three on either side of the furnace, and opposite, or thereabout, the following points: the forward end of the chamber $a a'$; the rear end of the chamber $a a'$, and a point midway between the first two named. The pipes I I, &c., are carried up within the walls, to the upper part of the furnace, and respectively into chambers J J, &c., arranged in the furnace-walls. The latter are perforated, as shown at K K, &c., Fig. 3, opposite the chambers J J, &c., to enable the blast to enter the furnace. All of the pipes I I, &c., are provided with cut-off valves $i i$, &c., and that part of the branch f which enters the ash-pit is also furnished with a cut-off, L, operated by a lever, l , Fig. 1. The main branch pipes $f f'$ are contained in the furnace-walls until they pass the flue-bridge, and they are then carried beneath the furnace bottom M. N N N, &c., Figs. 1 and 2, represent doors arranged on the outside of the furnace-wall, and opposite, respectively, the chambers J J, &c. O O, Figs. 3 and 4, represent

two similar water-boxes arranged upon the furnace-floor, and in the manner indicated in Fig. 4. They are independent of each other, and are suitably supplied with water.

The operation of the invention is as follows:

The puddling-chamber is charged in the two places *a* and *a'*, and the furnace is fired in the ordinary way. By reason, however, of the proportions of the furnace and the relative arrangement of the places *a* and *a'* and the fire, the heat is concentrated and economized, and the desired result is produced with a smaller consumption of fuel than has hitherto been used. The process is further cheapened by the improved method of using the hot-air blast, and which also enables a better quality of iron to be produced. By means of the branch pipes *I I*, &c., the blast can be admitted, as desired, to any part of the furnace, combustion can be made more complete, and the degree of heat can be suitably modified. In this way the furnace is brought under perfect control, and, by reason of this, not only the right degree of heat can be maintained, but the furnace, if desired, can be heated differently at different points. A further important advantage accrues from this control: hitherto it has been impracticable to always heat a puddling-furnace to the highest degree desirable, for the reason that in so doing a portion of the iron in one part of the furnace might be overheated. With the present improvement a very high degree of heat can be safely maintained at any point without endangering the contents of the furnace elsewhere. This enables the iron to be puddled at such a degree of heat as to cause the removal from the product of objectionable ingredients which hitherto have remained in ordinary puddled iron. By reason of the shape of the wall at the neck of the furnace, the flame is thrown back into the furnace, and, in consequence, the heat is further economised. In use, the perforations in the furnace-walls, through which the blast enters from the pipes *I I*, &c., are apt to be closed from the action

of the fire upon the walls, and from the collection of incombustible matter. In such a condition the doors *N N*, &c., are opened, and, by the insertion of a suitable tool the closed apertures are punctured and reopened. The lower part of the furnace is cooled by means of water circulating through the boxes *O O*. By using two boxes entirely independent of each other, no trouble arises from the expansion and contraction of the material composing the boxes, which difficulty exists when a single box only extending around the hearth is employed. To increase the fire, the blast is turned into the ash-pit.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The furnace *A*, chamber *a a'*, pipes *f f'*, boxes *G G*, pipes *I I I*, &c., combined and operating substantially as described.

2. The furnace *A*, chamber *a a'*, pipes *f f'*, boxes *G G*, pipes *I I*, &c., chambers *J J*, &c., perforations *K K*, &c., and doors *N N*, &c., combined and operating substantially as described.

3. The combination of the furnace *A*, pipes *I I*, &c., chambers *J J*, &c., perforations *K K*, &c., and doors *N N*, &c., substantially as described.

4. The furnace *A*, chamber *a a'*, and pipes *I I*, &c., chambers *J J*, &c., and perforations *K K*, &c., combined and arranged substantially as described.

5. A puddling-furnace having its rear-end wall *E*, constructed so as to form the re-entering angles *e e'*, substantially as and for the purpose described.

6. The combination of the furnace *A*, pipes *I I*, &c., chambers *J J*, &c., perforations *K K*, &c., and valves *i i*, &c., substantially as described.

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Witnesses:

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