No. 712,636. Patented Nov. 4, 1902.

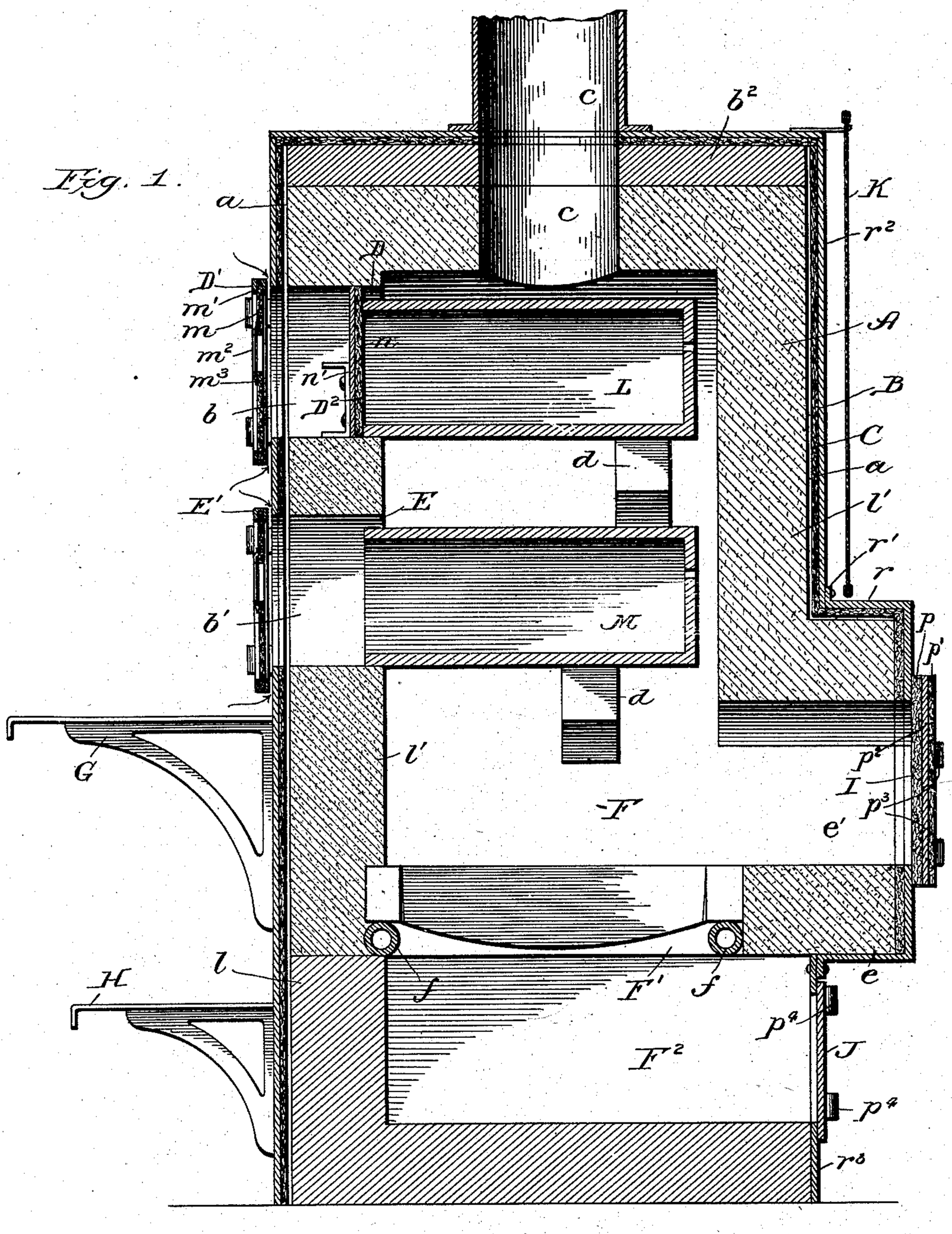
C. S. BATCHELDER.

FURNACE.

(Application filed Jan. 4, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



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Inventor
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By Dyrenforth & Dyrenforth & Lee,
Att'ys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(No Model.) 2 Sheets—Sheet 2.

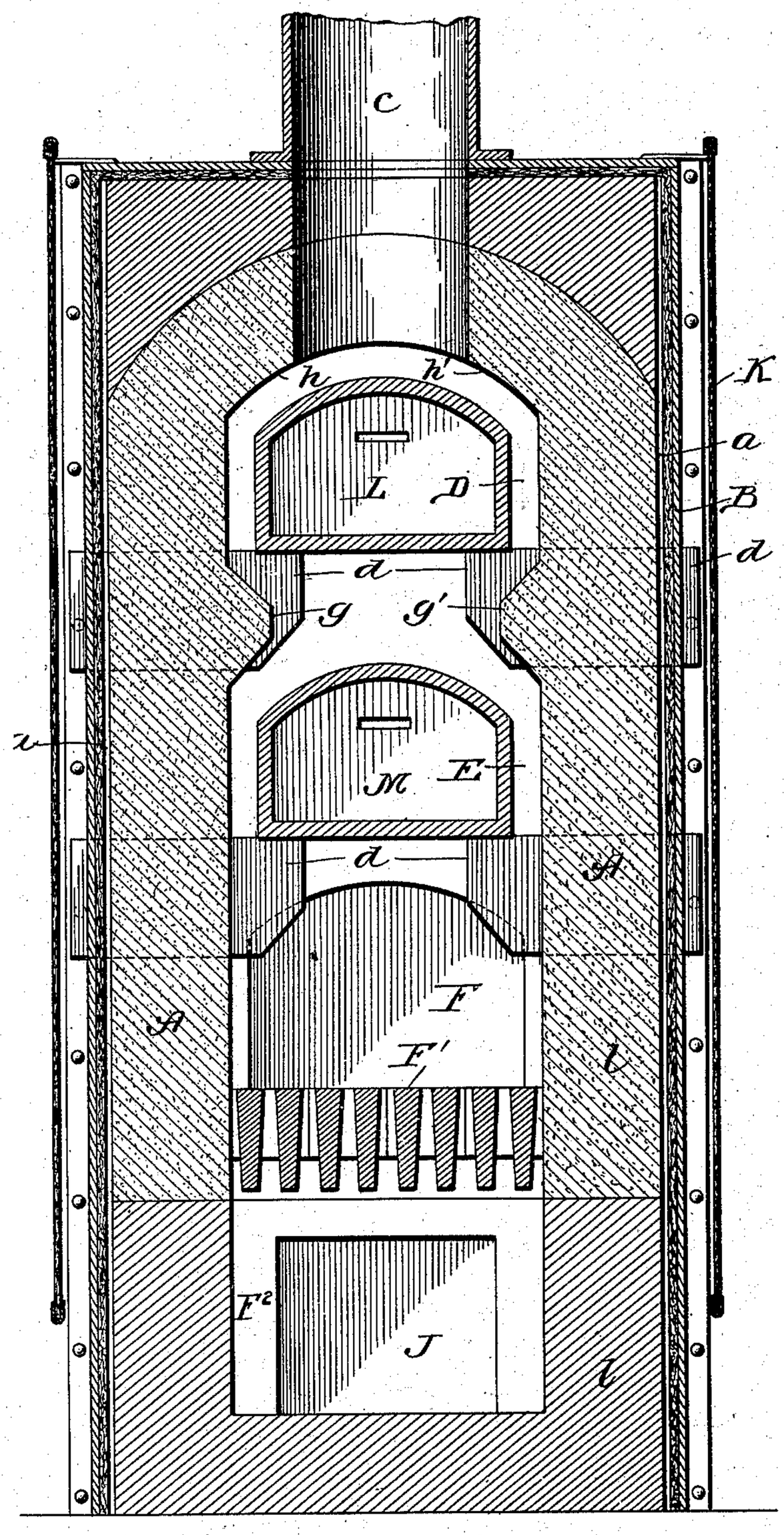


Fig. 2.

Fig. 2a.

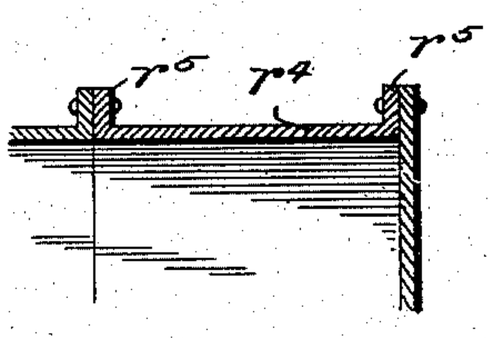


Fig. 3.

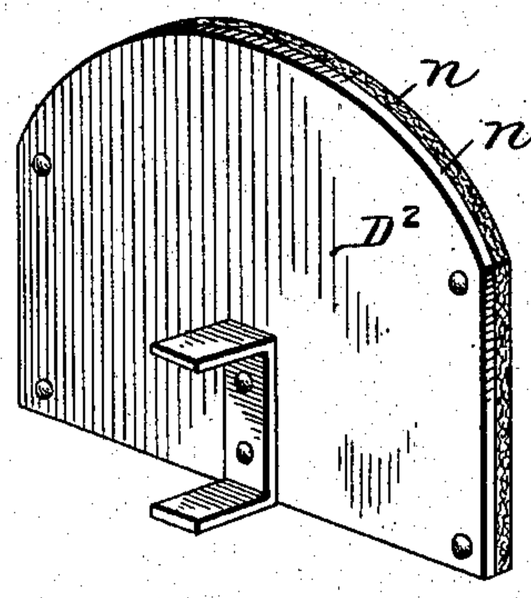
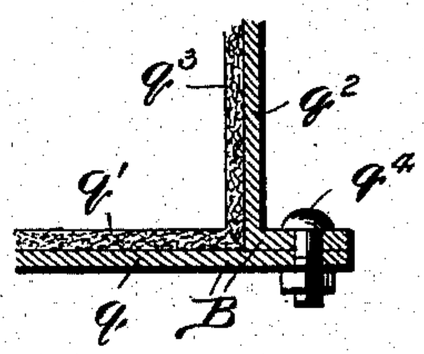


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHESTER S. BATCHELDER, OF SPOKANE, WASHINGTON.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 712,636, dated November 4, 1902.

Application filed January 4, 1901. Serial No. 42,065. (No model.)

To all whom it may concern:

Be it known that I, CHESTER S. BATCHELDER, a citizen of the United States, residing at Spokane, in the county of Spokane and State of Washington, have invented a new and useful Improvement in Furnaces, of which the following is a specification.

My invention relates particularly to permanent muffle-furnaces for use in assaying; and my object is to provide a furnace of this kind of generally improved construction which shall replace the ordinary brick muffle-furnaces used for the same purpose. It is well known that the brick furnaces of this character are of necessity provided with very thick walls, thus making the furnaces heavy, expensive, unportable, and hard to set up. By means of my improvements the furnace is rendered light, made readily portable, cheapened in construction, and may be readily set up by unskilled persons.

My invention is shown embodied in a two-muffle furnace in the accompanying drawings.

In the drawings, Figure 1 is a view in vertical longitudinal section of a furnace embodying my improvements; Fig. 2, a view in transverse vertical section of the same; Fig. 2^a, a broken horizontal section taken at the fire-door enlargement of the furnace; Fig. 3, a view of a well-known removable door which is employed while the furnace is being used for smelting purposes, and Fig. 4 a broken sectional view illustrating the preferred means for securing the sides of the casing together.

The furnace comprises in the preferred construction a lining A of refractory material, a metallic casing B, a lining C of asbestos, said lining being separated from the fire-lining A by an air-space *a*, muffle-chambers D and E, a fire-chamber F, a grate F′, an ash-chamber F^2, hinged muffle-chamber doors D′ E′, removable muffle-chamber doors D^2, only one of which is shown, shelves G H at the front of the furnace, a fire-chamber door I at the rear of the furnace, an ash-chamber door J directly beneath the fire-chamber door, and asbestos sheets K, covering the sides of the furnace and preferably supported at a distance from the casing to afford air-space between them and the casing.

The furnace is of general rectangular cross-section and is provided with muffle-chamber openings *b b′*, an outlet-flue *c*, muffle-supports *d*, an enlargement *e* provided with an opening *e′* for the fire-chamber, said opening being closed by the door I, and grate-supports *f*. Muffles L and M are shown in the chambers D and E, respectively, the rear portions of the muffles being supported by the tiles *d* and the front portions therof by the bottom walls of the openings *b b′*. As shown in Fig. 2, the muffle-chambers are of only slightly-greater width than are the muffles, and the walls forming these chambers are contracted or arched at points *g g′* and *h h′*. The contraction at the points *g g′* is above the lower muffle and beneath the upper muffle, the effect being to confine the hot products of combustion closely to the muffles during their passage to the flue *c*.

The casing B is preferably of sheet-steel, the preferred manner of joining the parts being shown in Fig. 4. The lining *a* comprises, as shown, blocks *l*, *l′*, and l^2, the same being suitably molded and recessed to provide the openings and passages heretofore mentioned. The muffle-supports *d* project through lateral openings in the wall of the furnace and the casing thereof, as shown in Fig. 2, whereby said supports are rendered readily adjustable and replaceable. The air-space *a* is provided for in any suitable manner, as by making the metallic casing of somewhat greater dimensions than the outer dimensions of the refractory lining and simply interposing the sheets of asbestos loosely, or the asbestos sheets may be supported at their upper ends. The space allows for expansion of the refractory lining without warping of the casing.

The muffle-chamber doors D′ E′ are preferably of sheet-asbestos *m*, having metallic binding *m′*, a mica sight-opening m^2, and metallic binding m^3 thereat. The hinges of the doors are preferably so constructed and attached that when the doors are in the position at Fig. 1 they do not come in contact with the furnace, but allow air-openings at their edges. The doors D^2 are of sheet-asbestos *n*, covered by sheet metal *n′*. As will be readily understood by those skilled in the art, the doors D^2 are not used when the furnace is used for cupellation, and at such time the interior of the muffle can be viewed

through the mica m^2, the hinged muffle-chamber door acting at such time as an effective shield to protect the operator. The doors D^2, as is well understood, are used when smelting. The door I comprises sheet-asbestos $p\,p'$ and an interposed sheet of metal p^2. Said door is connected with the furnace by suitable hinges p^3 and fits closely, as shown in Fig. 1. The door J is of sheet metal and supported on hinges p^4. By constructing the door I as described it is rendered light, comparatively inexpensive, and free from danger of warping.

It should be noted that the grate F′ is supported at a comparatively short distance below the muffle M, the effect being to enable the use of short-flame combustibles, such as coke, anthracite coal, &c. The furnace is without other opening for charging with fuel than the opening e', and the opening e' is at the level of the fire-chamber, so that no solid fuel can be thrown upon or lodge upon the muffles. This is of very great importance both in preserving the life of the muffle and in keeping the muffle clean, so that the full effect of the heat is secured.

It may now be stated that by employing the construction described, forming the muffle-chambers in the manner set forth, and locating the grate more closely to the lower muffle than has heretofore been common in this class of furnaces I am enabled to secure the desired heat at the muffles with less fuel than has heretofore been necessary and am also enabled to dispense with the thick outer wall of brick which has heretofore been employed. The result is to reduce the weight of the furnace more than one-half, to greatly cheapen the cost of construction, and to provide a furnace which can be set up by unskilled persons and which can be packed into small space for shipping purposes.

In Fig. 4 I have illustrated clearly the connections between the sheet-metal plates comprising the metallic casing of the furnace. q represents the front metallic sheet, q' the front asbestos sheet, q^2 a side metallic sheet, q^3 a side asbestos sheet, and q^4 one of the connecting bolts or rivets employed. It will be observed that the side sheets have their front vertical margins bent outwardly at right angles to the sheets and that the front sheets have their lateral edges projecting flush with the vertical edges of outturned portions of the side sheets. Thus attaching-flanges are provided for the side sheets, and the front sheets are extended to connect with said flanges. The construction at the other vertical corners of the furnace is similar.

In Fig. 2^a I have illustrated the manner in which the extension e is incased. The metallic sheet r covers the top, the vertical rear surface, and the under surface of said extension and is connected by flanges r' to the sheets r^2 and r^3, located, respectively, above and below said enlargement. Side sheets r^4 are provided for said enlargement and connected by flanges r^5 with the adjacent parts.

The operation of furnaces of the same general construction as the one herein described is well understood, and it is only necessary to add that the fuel is charged at the door I and the ashes removed at the door J, both of which are located, preferably, at the rear of the furnace, though they may be located at a side of the furnace or in front.

What I claim as new, and desire to secure by Letters Patent, is—

1. A muffle-furnace for the purpose stated, comprising a metallic casing, a lining of refractory material, an asbestos packing interposed between the metallic casing and said refractory lining, a solid-fuel-burning fire-box having a lateral stoking-opening, said fire-box and opening being located in the base of the furnace, a muffle-chamber above the fire-box and a door for said muffle-chamber arranged to admit air to said chamber.

2. A muffle-furnace for the purpose stated, comprising a metallic casing, a lining of refractory material, an asbestos packing interposed between the metallic casing and said refractory lining, a solid-fuel-burning fire-box having a lateral stoking-opening, said fire-box and opening being located in the base of the furnace, a plurality of muffle-chambers in vertical alinement with the fire-box, contractions between said muffle-chambers, and doors for said muffle-chambers arranged to admit air thereto.

3. A muffle-furnace for the purpose stated, comprising a metallic casing, a lining of refractory material, an asbestos packing interposed between the metallic casing and said refractory lining, a solid-fuel-burning fire-box having a lateral stoking-opening, said fire-box and opening being located in the base of the furnace, a muffle-chamber above the fire-box, a door for said muffle-chamber arranged to admit air to said chamber, and asbestos shields at the rear and sides of the furnace.

4. In a furnace having a muffle-chamber, a swinging door affording a heat-screen for the muffle-chamber, said door being mounted to maintain an air-inlet at its edges when the door is in its closed position and comprising a sheet of asbestos having a central sight-opening guarded by a transparent covering, substantially as described.

CHESTER S. BATCHELDER.

In presence of—
E. DEMPSIE,
CHAS. P. ROBBINS.