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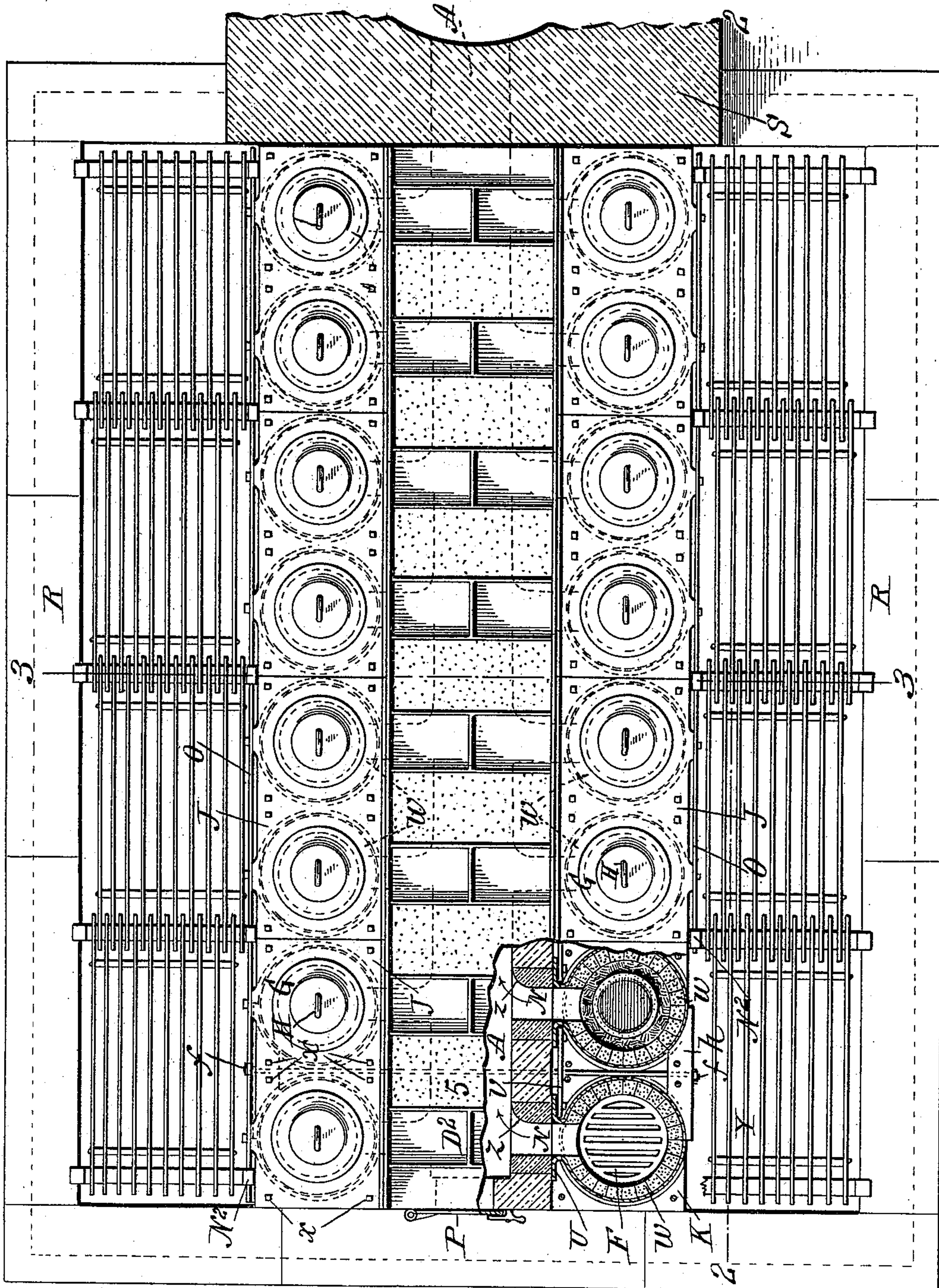
Patented Feb. 21, 1899.

E. P. MARSH & E. MILLETT.
CRUCIBLE FURNACE.

(Application filed Oct. 27, 1898.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses:
J. H. Garfield
H. D. Clemons

Fig. 1.

Inventors,
Edward P. Marsh, and
Ellis Millett,
by *Chapman & Co.*
Attorneys.

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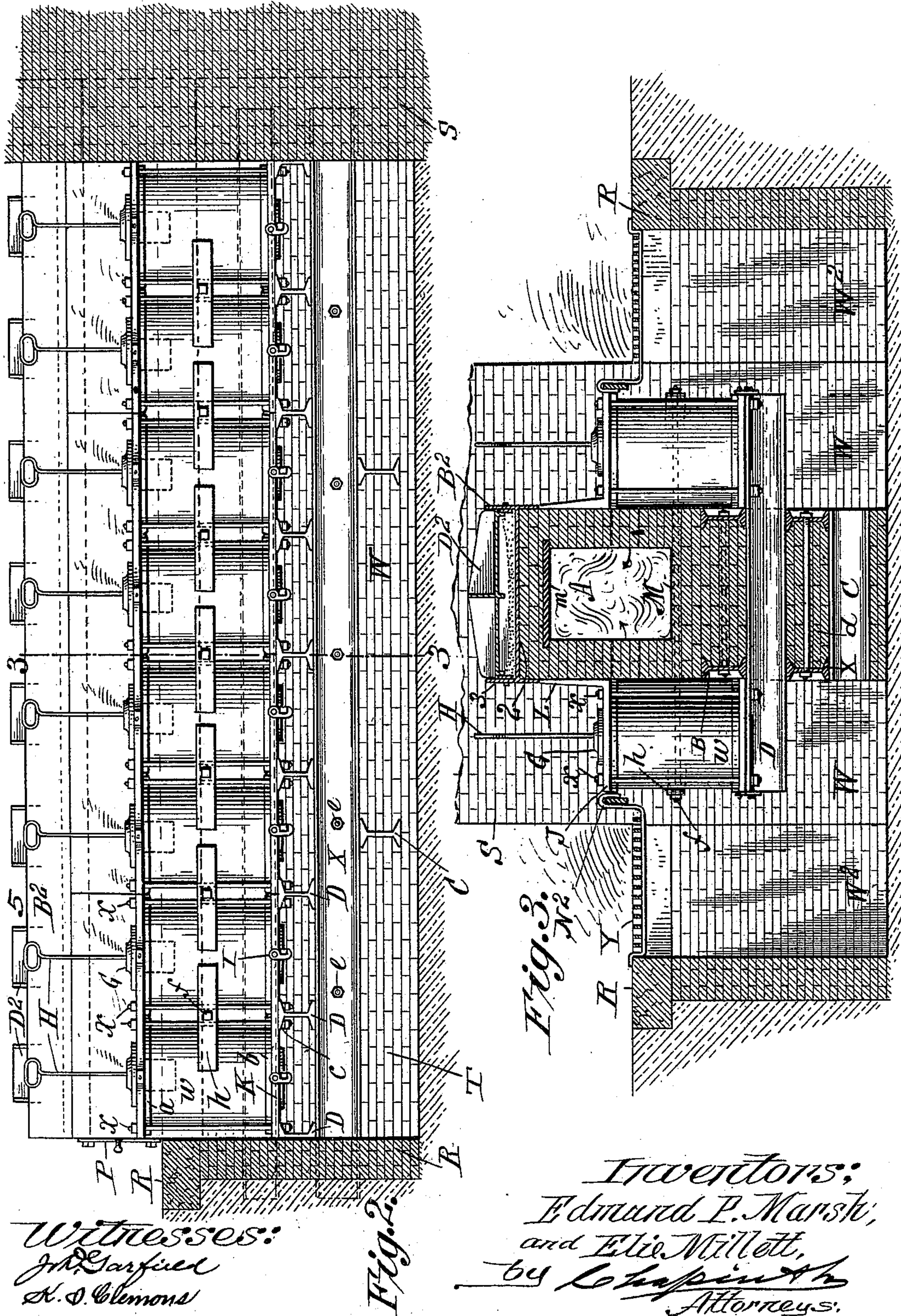
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Witnesses:
J. D. Garfield
H. D. Clemons

Fig. 2.

Inventors:
Edmund P. Marsh,
and Elie Millett,
by *Chapin & Co.*
Attorneys.

No. 619,973.

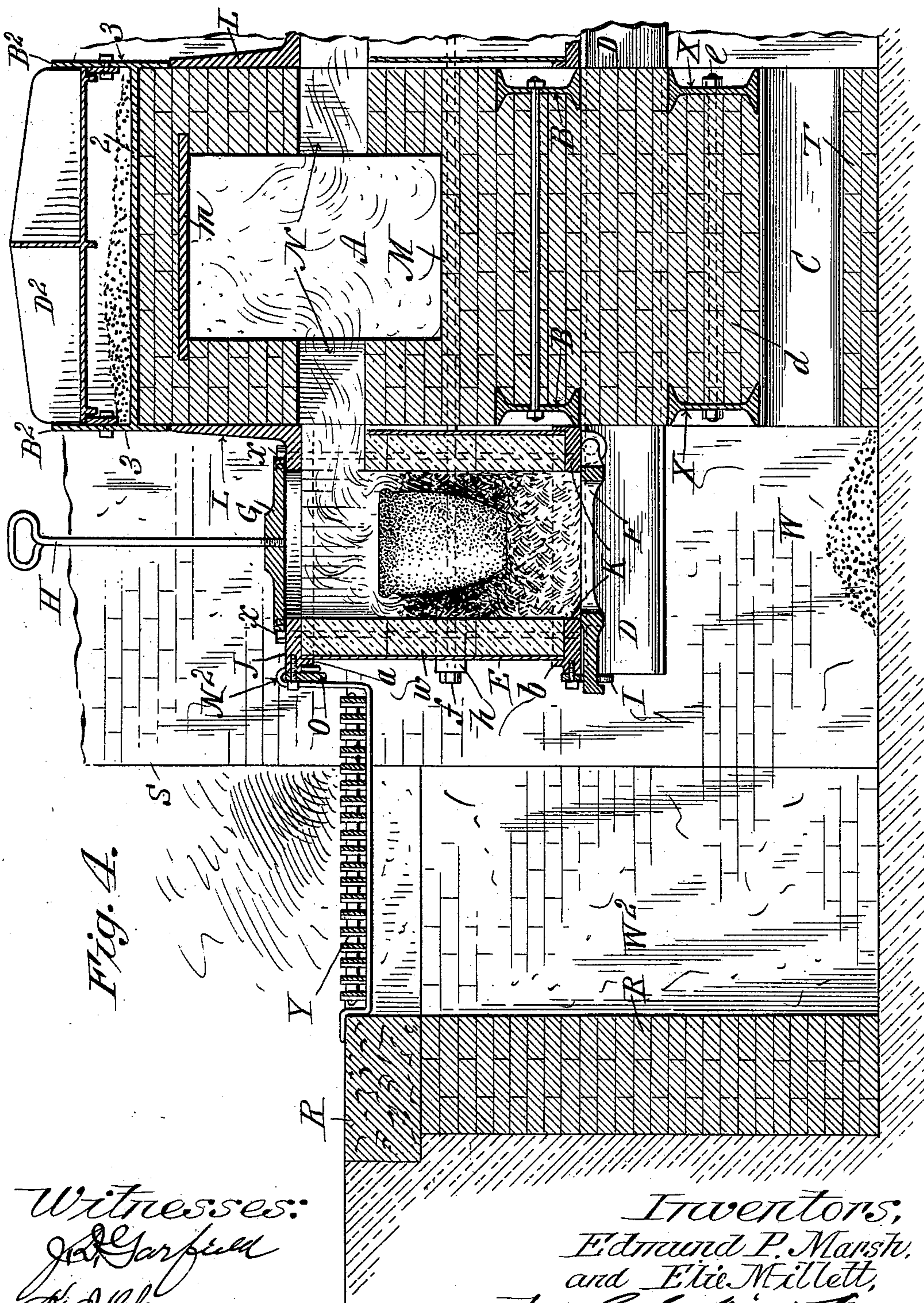
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Witnesses:
J. A. Garfield
H. J. Clemons

Inventors,
Edmund P. Marsh,
and Elie Millett,
by *Chapman & Co.*
Attorneys.

No. 619,973.

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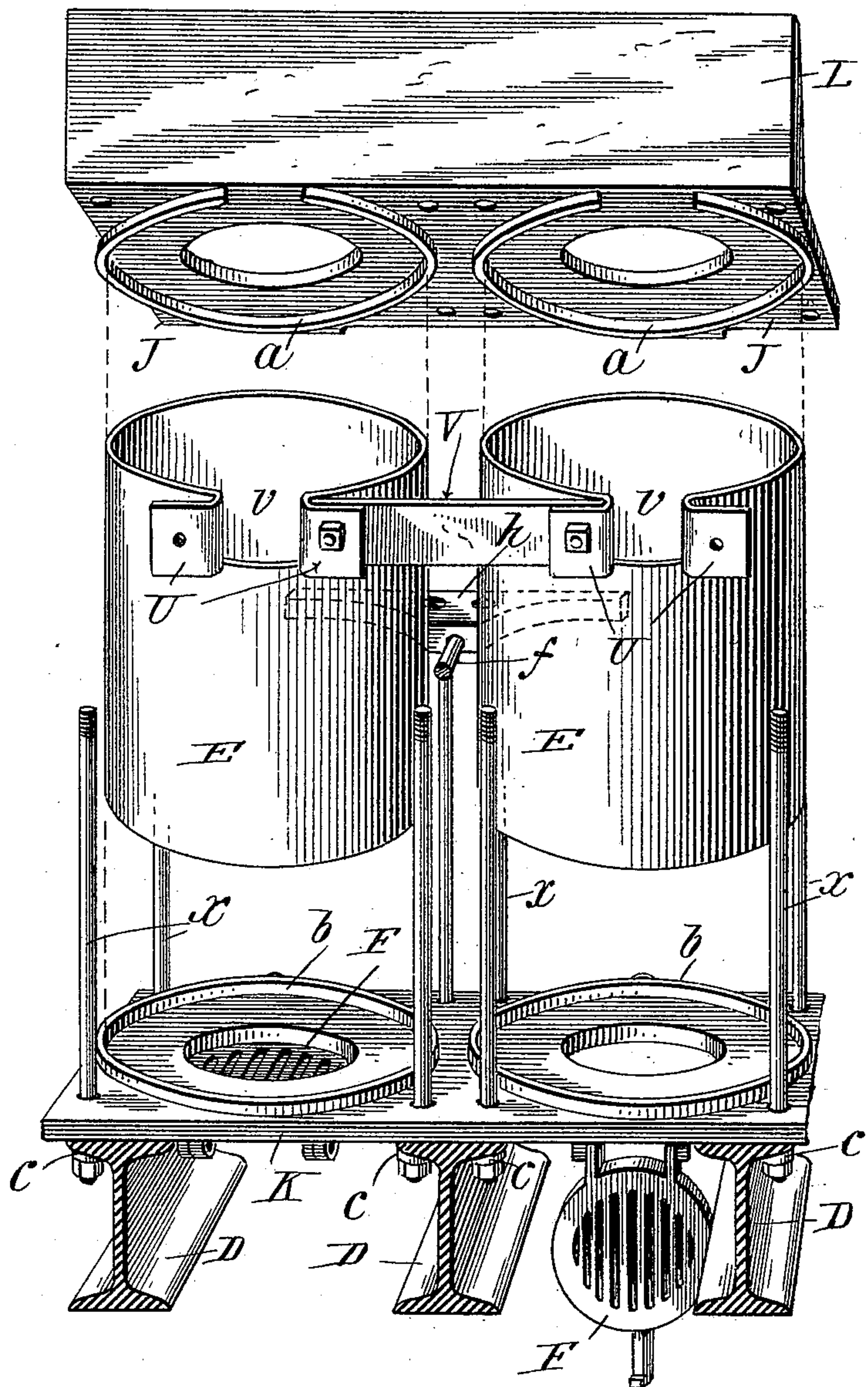
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Fig. 5.



Witnesses:
J. D. Garfield
H. D. Clemons

Inventors:
Edmund P. Marsh,
and Elie Millett,
by C. Chapman
Attorneys:

No. 619,973.

Patented Feb. 21, 1899.

E. P. MARSH & E. MILLETT.

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(Application filed Oct. 27, 1898.)

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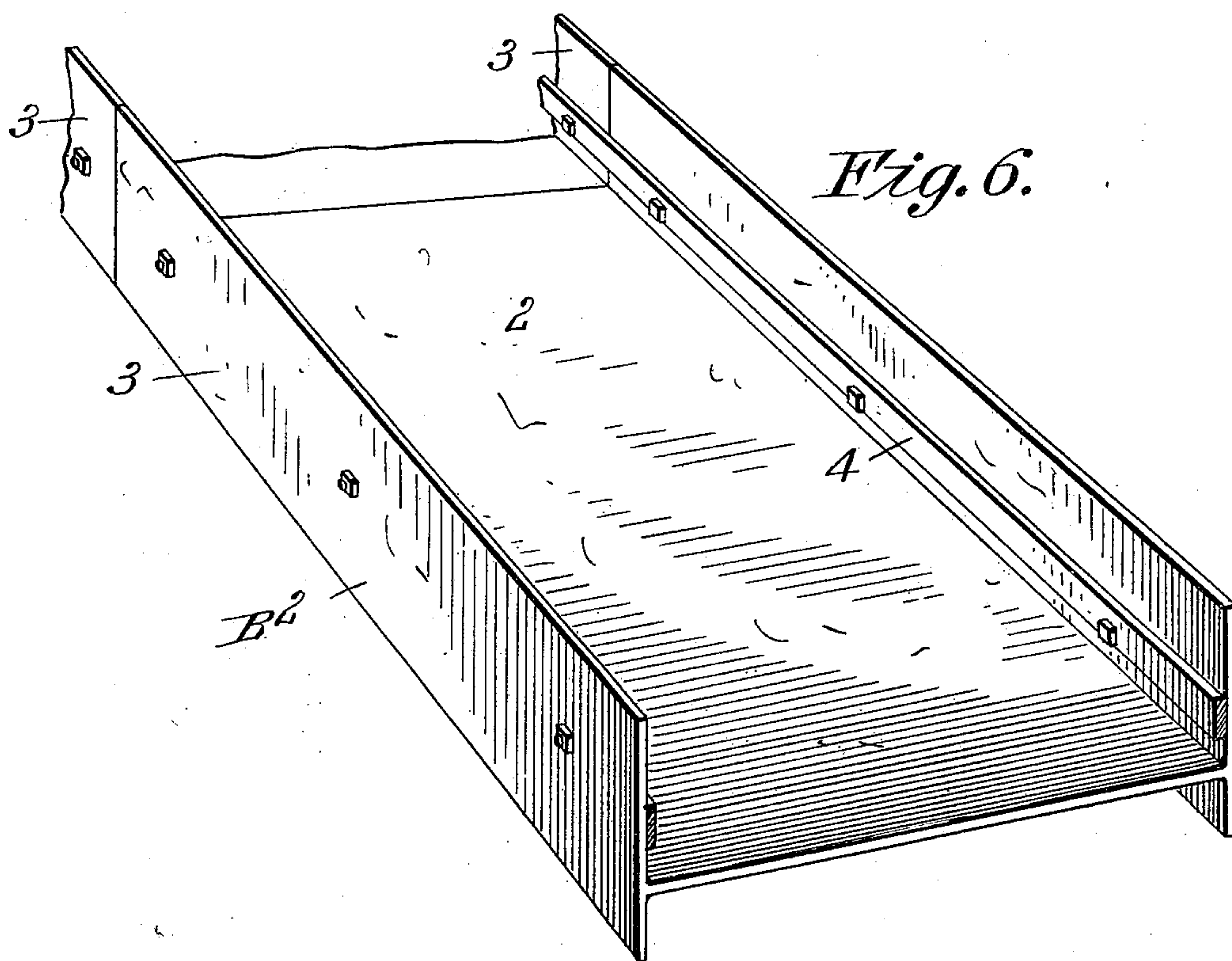
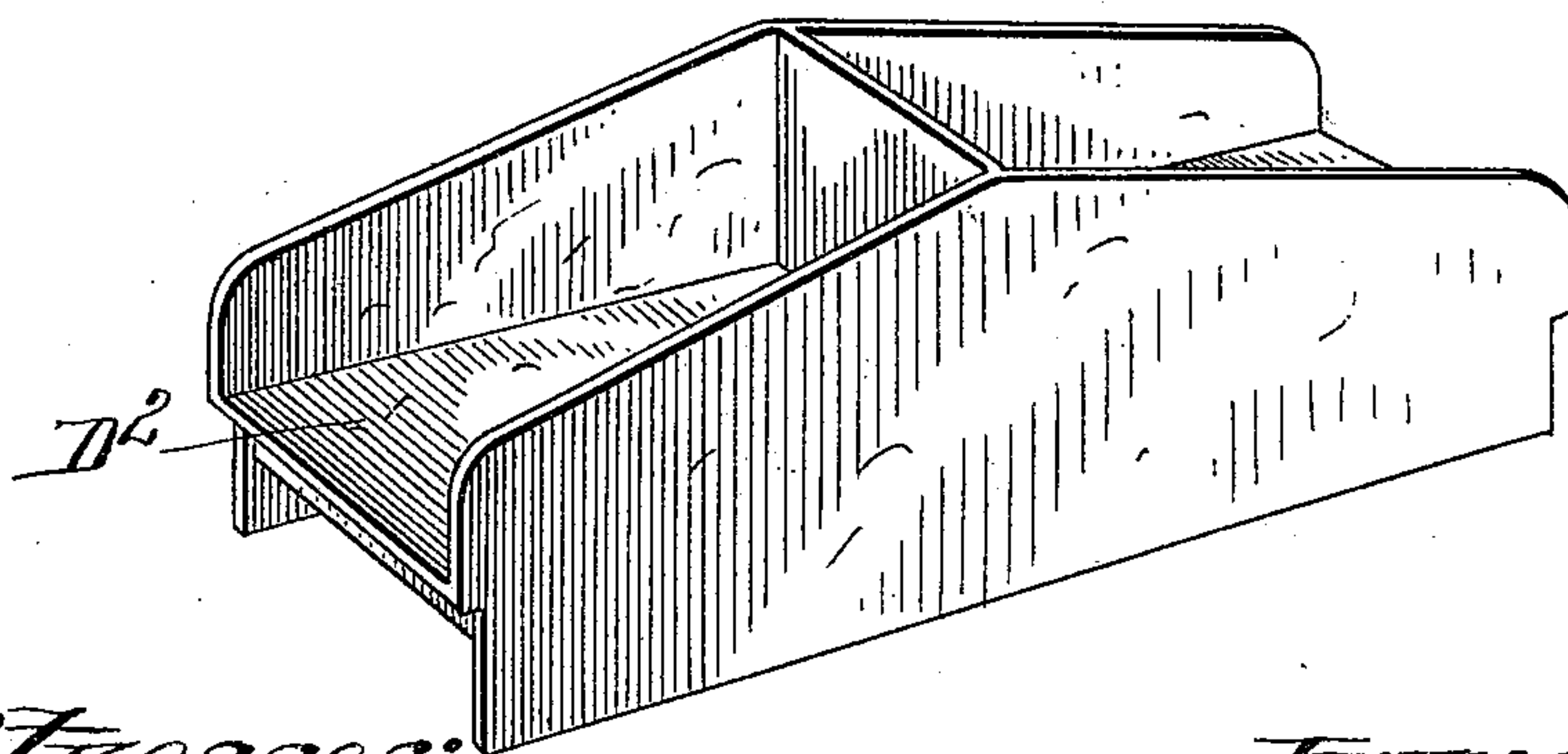


Fig. 7.



Witnesses:
J. D. Garfield
H. J. Clemond

Inventors,
Edmund P. Marsh,
and Elie Millett,
by *Chapman & Co.*
Attorneys.

UNITED STATES PATENT OFFICE.

EDMUND P. MARSH AND ELIE MILLETT, OF SPRINGFIELD, MASSACHUSETTS.

CRUCIBLE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 619,973, dated February 21, 1899.

Application filed October 27, 1898. Serial No. 694,713. (No model.)

To all whom it may concern:

Be it known that we, EDMUND P. MARSH and ELIE MILLETT, citizens of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Furnaces for Melting Metals and Supporting Constructions Therefor, of which the following is a specification.

10 This invention relates to furnaces for melting metals, the construction herein illustrated being one which is particularly adapted for use in melting copper for the production of brass castings, the object being to provide an
15 improved furnace-supporting substructure and means for fixing the furnaces thereto, whereby the durability of the latter is much increased; also, to provide an improved superstructure for further sustaining said furnaces
20 in the most economical operative positions, having improved flue connections between said furnaces and the chimney with which they are connected; also, to provide improved pit constructions before the furnaces, where-
25 by convenient access is had to the grates thereof and ample room is provided for dumping the waste matter therefrom and for performing all work required to be done thereunder, and to provide other improved
30 details of construction which contribute to the solidity, convenience, and durability of the entire structure, as hereinafter set forth; and the invention consists in the peculiar construction and in the arrangements of the
35 various elements of the complete structure, all as hereinafter fully described, and more particularly pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a plan view of a metal-
40 melting-furnace construction, partly in section, comprising two groups of eight furnaces each constructed according to our invention, a section of a chimney being shown at one end thereof. Fig. 2 is an outer side elevation of
45 one of said groups of furnaces and of the sub and super structure thereof, the longitudinal side wall of the pit opposite the furnaces being removed and portions of the front end wall and of the chimney being shown. Fig.
50 3 is a transverse section on line 3 3, Fig. 2, looking from the end of the structure opposite the chimney. Fig. 4 is a vertical sec-

tional view of the central portion of the structure through one of the furnaces, the pit-wall at one side, and the grating extending be- 55
tween said furnace and said wall and showing a portion of the chimney back of said furnace. Fig. 5 is a perspective view illustrating the details of the construction of the furnace-supporting devices, the upper and 60
lower furnace-plates, and cylinder-casings and uniting devices, and the rods binding said plates to the casings, and the devices serving to simultaneously bind the furnaces on the
opposite sides of the superstructure to the 65
latter. Fig. 6 is a perspective view of one complete top frame and a part of a second one, which covers the top and incloses a portion of the side walls of the brick superstructure. Fig. 7 is a perspective view of one of 70
the metal-holding boxes or receptacles supported on said top frame.

Referring to the drawings, the said substructure comprises a base or foundation T, of masonry, in which are laid or embedded 75
the transverse I-beams C, Figs. 2 and 3, and the longitudinal I-beams X X, extending transversely of and resting upon said I-beams C and bound together and against said base by the transverse bolts e. The various 80
I-beams herein mentioned are preferably of wrought-iron. The masonry filling d between said I-beams X X, with the before-mentioned elements, completes said substructure, upon which are supported the below- 85
described elements of the superstructure.

By the word "masonry" above used is meant any suitable solid brick or stone work laid in lime and sand, mortar, or cement.

The base of said superstructure consists of 90
a series of transverse I-beams D, whose lower edges rest directly upon said beams X, as shown in Figs. 2 and 3, and between said I-beams D is a filling of masonry, as shown in Fig. 2, which is continued upwardly, as be- 95
low described. Said I-beams D have their extremities extending considerably beyond the opposite sides of said substructure, and thereby form supports for the furnaces w, as more particularly described farther on. (See 100
Figs. 3, 4, and 5.) On said I-beams D (of which there are nine shown in the drawings) either eight or sixteen furnaces may be supported, according to the desired output of

melted metal, or the construction may be adapted to a smaller or greater number of furnaces, as desired. On said I-beams D are located two other I-beams B B in positions substantially in line with said longitudinal I-beams X X, and, like the latter, they are also tied against outward deflection by transverse bolts *e*. The said beams B B, resting upon said I-beams D, have a position in the superstructure directly back of the furnaces, as clearly shown in Figs. 3 and 4, and therefore they do not appear in Fig. 2. The extremities of said I-beams X X and B B extend into the masonry at each end of the furnace group, as indicated in dotted lines in Fig. 2, and thereby the furnace-supporting structure is still further braced against any lateral movement from any cause. As heretofore stated, said filling of masonry between said I-beams D is continued upwardly between the I-beams B B and above the latter has the width of the outside lines thereof, as shown, and from the upper edge of the last-named beams said masonry extends upward to a sufficient height to provide for a main flue A of sufficient cross-sectional area, with which the individual flues N of the furnaces communicate. The upper wall of said main flue consists of iron plates *m*, as shown, and the lower wall or bottom M is carried some distance below the points of connection of the furnace-flues N therewith, as shown in Fig. 4. The depth of said flue vertically so provided for tends to prevent any impediment to a constant and ample draftway between the furnace-flues and the exit end of the main flue, which enters the chimney S and has a door P at its front end for obvious uses. The said flues N have in each of them, as shown in Fig. 1, the corner thereof around which the products of combustion from the furnace are drawn in entering the said main flue A made of circular form, as shown at Z in said last-named figure. This flue construction tends to facilitate the draft and increase the melting capacity of the furnaces. The upper extremity of said superstructure is covered by one or more top frames B², of iron, which frames comprise, as shown in detail in Fig. 6, a floor 2, intermediate of the upper and lower edges of two sides 3 3 thereof. The lower edges of said sides extend downward over the opposite sides of the said superstructure for a certain distance, and the floor 2 of said frame lies upon and covers and protects the top thereof. In this way the mason-work is protected and retained in position and the injurious cracking thereof from the effects of heating and cooling is more or less obviated and the upper corners thereof are inclosed and protected from injury. Said frames are united by straps 4, which are bolted to the inner walls of said sides and serve to tie said frames together and also as supports, as shown in Figs. 3 and 4, for a series of boxes D² for containing metals which are to be used in the furnaces. Each of said boxes is di-

vided by a central partition, as shown, whereby two separate metal-holding compartments are provided which are severally accessible adjacent to the two groups of furnaces. Said metal-receiving boxes provide means for containing the metals which are weighed out and given to the melters to be used in each furnace, and thus they serve to obviate errors in the mixture of such metals which are so likely to occur when they are, as is common in foundries, unguardedly laid on the floor near the furnace, from whence they may be taken unintentionally and used in a furnace for which they were not intended. Between said boxes D² are provided spaces 5, through which molding and other sand used in a foundry may be placed on said floor 2 to be dried. The said side walls of the superstructure are still further supported by parts connected with the furnaces, and the means for supporting and attaching the same thereto is as below described.

Reference is above made to the I-beams D, which form supports for the said furnaces, and the latter are constructed and connected to said beams and to the said superstructure as follows: The furnaces *w* comprise each a cylindrical iron case E, having a flue-opening *v* in its rear side (see Fig. 5) and outturned uniting-lips U on each vertical border of said flue-opening. The said cases are united by a flat bar V, bolted to said lips U, whereby they are held in uniform vertical positions and are provided with the usual fire-brick lining. The completed furnaces are preferably connected and supported in pairs, as shown in said last-named figure and in Fig. 1. A bottom plate K, of cast-iron, having circular flanges *b* on its upper side, within which to receive the lower ends of said casings and having bolt-holes for the bolts *x* and a grate-opening therein, is provided. Also a furnace top plate J, of cast-iron, is provided, having similar flanges *a* to said flanges *b*, together with bolt-holes and a central opening, as shown, but having in addition thereto on its rear border an upwardly-extending back L, standing at right angles to the top plate proper and of gradually-increasing thickness from its upper edge to its junction with said top plate, to the end that when the latter shall be bolted against the outer side of the masonry of the structure, as shown in Fig. 3, it shall form an ample and strong side support therefor for holding the furnaces rigidly in upright positions. The said top and bottom plates J and K are clamped to the opposite end of the furnaces, and the latter are firmly bolted onto the said projecting ends of the I-beams D by the bolts *x*, as shown, whose lower ends extend through said bottom plate K and through the laterally-extending borders of said beams, and the upper ends thereof through said top plate J, as clearly illustrated in Fig. 3. In connecting the lower ends of said bolts to said I-beam borders tapering washers *c* are placed between said borders

and the nut on said bolt to provide a bearing for the nut at right angles to the axis of the bolt. The said furnaces after being arranged and bolted to said I-beams D, as described, are further supported bodily in operative positions against the side or sides of the flue-containing portion of the structure by the bolts *f*, which pass through the latter transversely below the main flue A and have their ends extending between the furnaces and through the binding-bars *h*, which lie against the outside of the furnaces, as shown in several of the figures, and are there secured by nuts thereon screwing against said bars *h*. The furnace-grates F are hinged to the under side of said bottom plate K, an arm on the front edge of the grate being engaged by a hook I, hung on the front edge of said plate, as shown in Fig. 4, whereby the grate is held up or dropped for dumping the same. The furnace-covers G are of the usual type and are provided with the long-stem handles H, whereby they are easily tipped and rolled off from and over the top of the furnaces on the said top plates J.

To obtain ample room beneath and in front of each group of the furnaces, the pit construction indicated in Figs. 1, 3, and 4 by W and W² is provided, and a removable grating Y, of iron, covers that part thereof in front of the furnaces. Said grating has its outer border resting on the outer side wall R of said pit, and its border next to the furnaces has hooks N² thereon, which engage a horizontal bar O, which is secured on the front edges of said top plates J of the furnaces. Said grating-covered-pit construction provides means for most advantageously manipulating the ashes and other matters from the furnaces and for removing the same, and the open grating of large superficial area in front of the furnaces permits an ample air-supply to the furnace-fires, whereby the draft is improved and metal is melted much faster than under the constructions heretofore usually prevailing, it having been found in practice that the furnace construction herein described has a melting capacity fully double that of furnaces as heretofore constructed and arranged. It will also be observed that the described means for supporting the melting-furnaces by rigidly bolting them to said I-beams D and not making their support dependent upon any masonry construction which is subject to be injuriously affected by heating and cooling, owing to the proximity of the furnace-fires, insures greatly-increased durability in the entire structure.

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

1. In a metal-melting-furnace construction, a suitable substructure, a superstructure comprising a series of iron I-beams extending transversely of, and bearing upon, said substructure, whose extremities extend beyond the sides of said substructure, several iron

I-beams extending longitudinally above, and bearing upon, said transverse I-beams, means for tying said longitudinal I-beams against outward deflection, and a masonry construction filling the space between said longitudinal I-beams and extending thereabove and containing a main flue for communication with a chimney, and a series of furnace-flues communicating therewith, substantially as described.

2. In a metal-melting-furnace construction, a substructure comprising a series of transverse and longitudinal iron I-beams and masonry, bolts interengaging said longitudinal beams and holding them against outward deflection, a superstructure comprising a series of iron I-beams extending transversely of, and bearing upon, said substructure, whose extremities extend beyond the sides of said substructure, and iron top frames having a floor covering the top of said superstructure and having parts covering the upper portion of the sides thereof, and having sides extending upwardly from said floor, substantially as described.

3. In a metal-melting-furnace construction, a substructure comprising masonry, longitudinal and transverse iron I-beams embedded in said masonry, bolts extending through said masonry and interengaging said longitudinal beams, a superstructure comprising transverse iron I-beams extending across said substructure the extremities of which last-named beams constitute supports for the melting-furnaces, a superstructure comprising longitudinal I-beams extending across said transverse beams, masonry in which the central portions of said transverse I-beams, and portions of said longitudinal beams, are embedded extending upwardly and containing a main flue for communication with a chimney, and furnace-flues communicating with said main flue, iron top frames having a floor covering the top of said superstructure and having parts covering the upper portion of the sides thereof and having sides extending upwardly from said floor, and a series of separated iron boxes for holding metals supported upon said frame sides, each having a metal-holding compartment open on the opposite sides of the superstructure, substantially as described.

4. In a metal-melting-furnace construction, a combined sub and super structure, containing a series of transverse iron beams whose extremities extend beyond the side of said structure and constitute supports for one or more metal-melting furnaces, combined with a furnace-supporting base-plate carried on said beams, one or more furnaces on said plate, a plate covering the top of said furnace or furnaces and having on its rear border an upwardly-extending back lying against the outer wall of the superstructure, and means for securing said beams, plates, and furnaces in united operative positions, substantially as described.

5. In a metal-melting-furnace construction, a combined sub and super structure containing a series of transverse iron beams whose extremities extend beyond the side of said structure and constitute supports for one or more metal-melting furnaces, combined with a furnace-supporting base-plate carried on said beams, one or more furnaces on said plate, a plate covering the top of said furnace or furnaces and having on its rear boarder an upwardly-extending back lying against the outer wall of the superstructure, vertical bolts engaging said beams and top plate, and means for clamping the furnaces bodily against the sides of the superstructure, substantially as described.

6. In a metal-melting-furnace construction, a combined sub and super structure containing a series of transverse iron beams whose extremities extend beyond the side of said structure and constitute supports for one or more metal-melting furnaces combined with a furnace-supporting base-plate carried on said beams, one or more furnaces on said plate, a plate covering the top of said furnace or furnaces and having on its rear border an

upwardly-extending back lying against the outer wall of the superstructure, vertical bolts engaging said beams and top plate, a clamp-bar engaging each pair of furnaces, and a bolt projecting from said superstructure and engaging said clamp-bar, substantially as described.

7. In a metal-melting-furnace construction containing a series of transverse iron I-beams whose extremities extend beyond the side of the structure and constitute supports for metal-melting furnaces, combined with a furnace-supporting base-plate carried on the extending extremities of said beams, two furnaces on said plate each inclosed in an iron casing, a bar uniting said casings, a top plate covering said furnaces, and bolts engaging said beams and top plate, and locking said furnace parts to said beams, substantially as described.

EDMUND P. MARSH.
ELIE MILLETT.

Witnesses:

H. A. CHAPIN,
K. I. CLEMONS.