No. 733,931. PATENTED JULY 21, 1903.

J. J. ANDERSON.

FURNACE FOR MELTING METALS.

APPLICATION FILED AUG. 19, 1901.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 2.

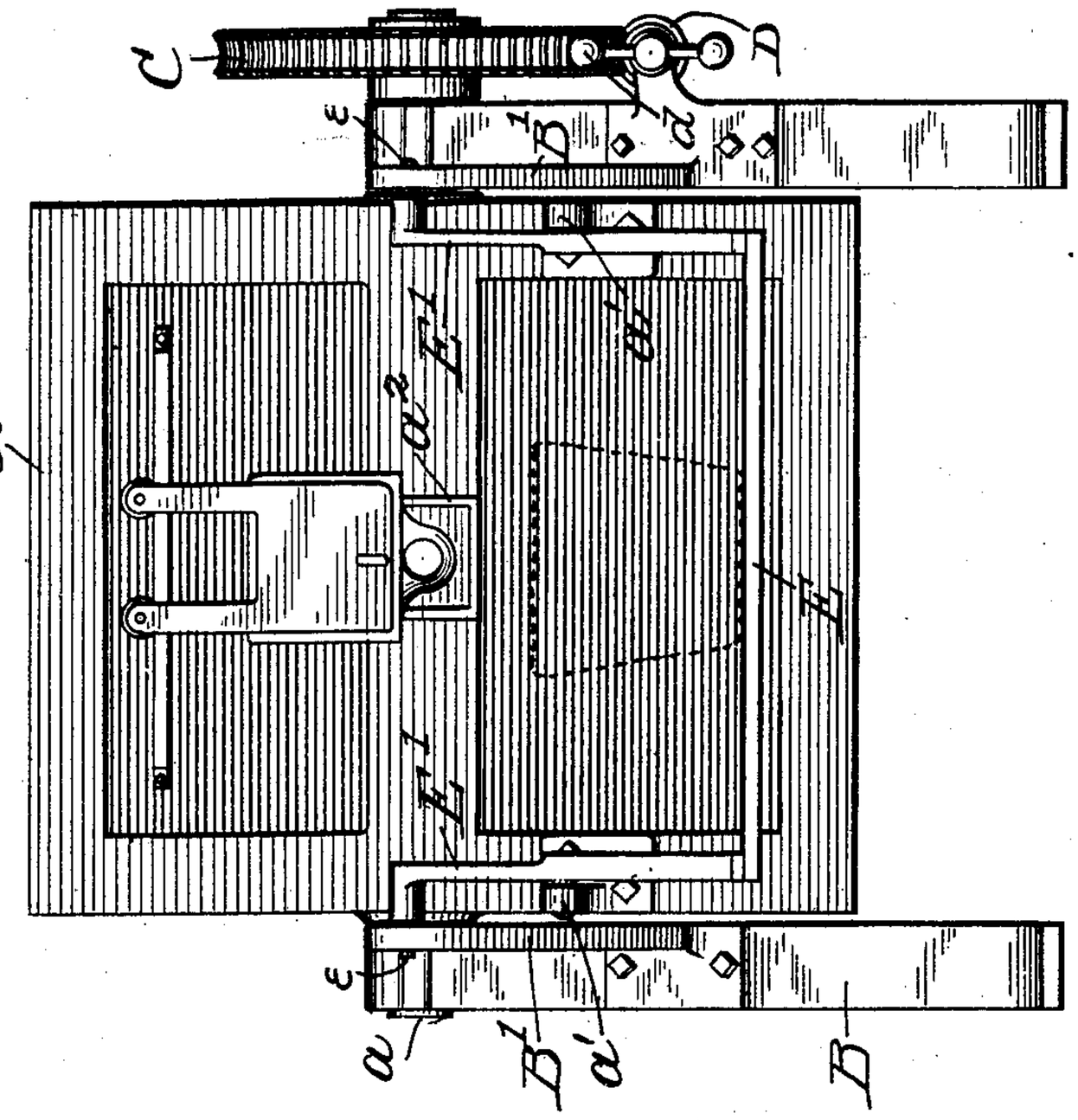
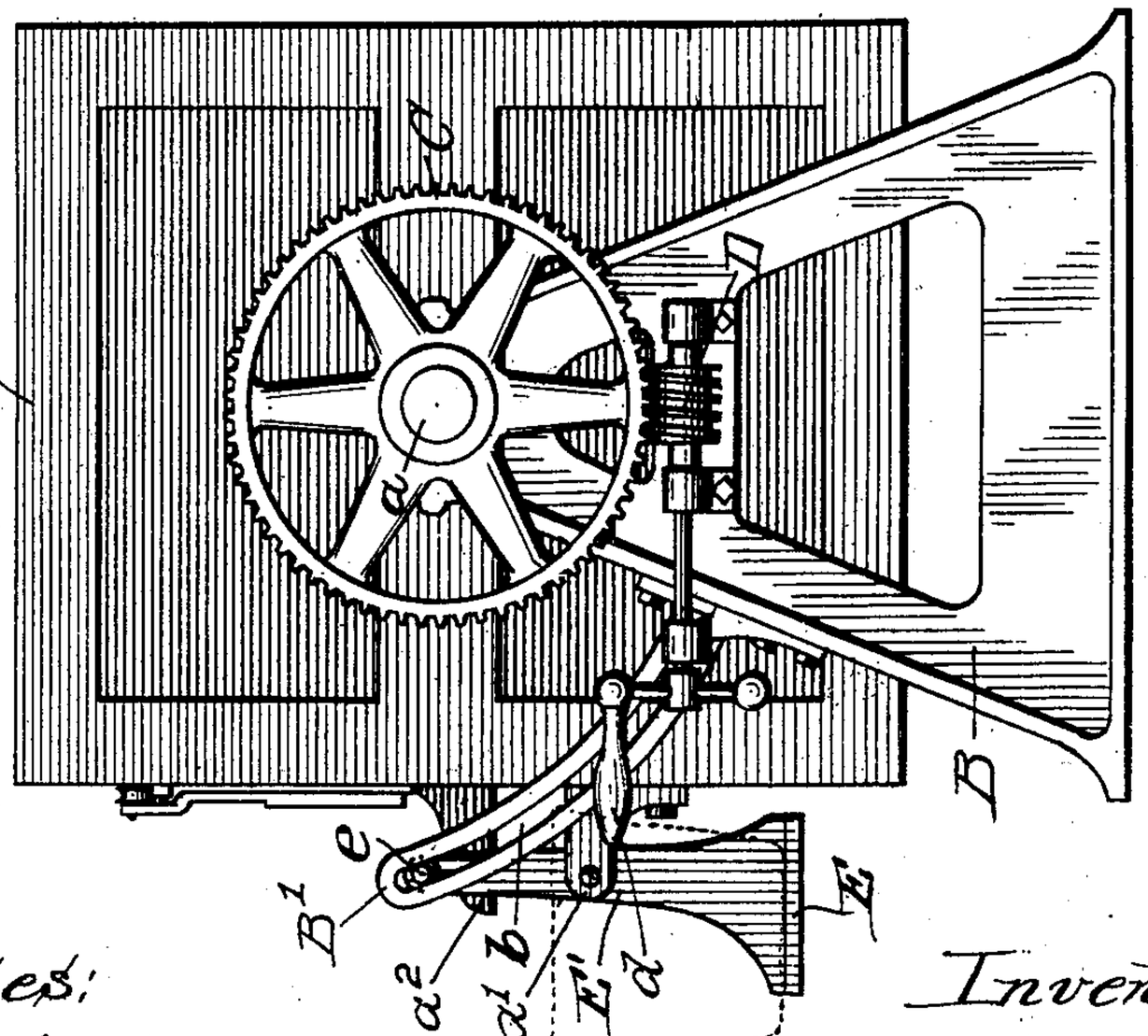


Fig. 1.



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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 4.

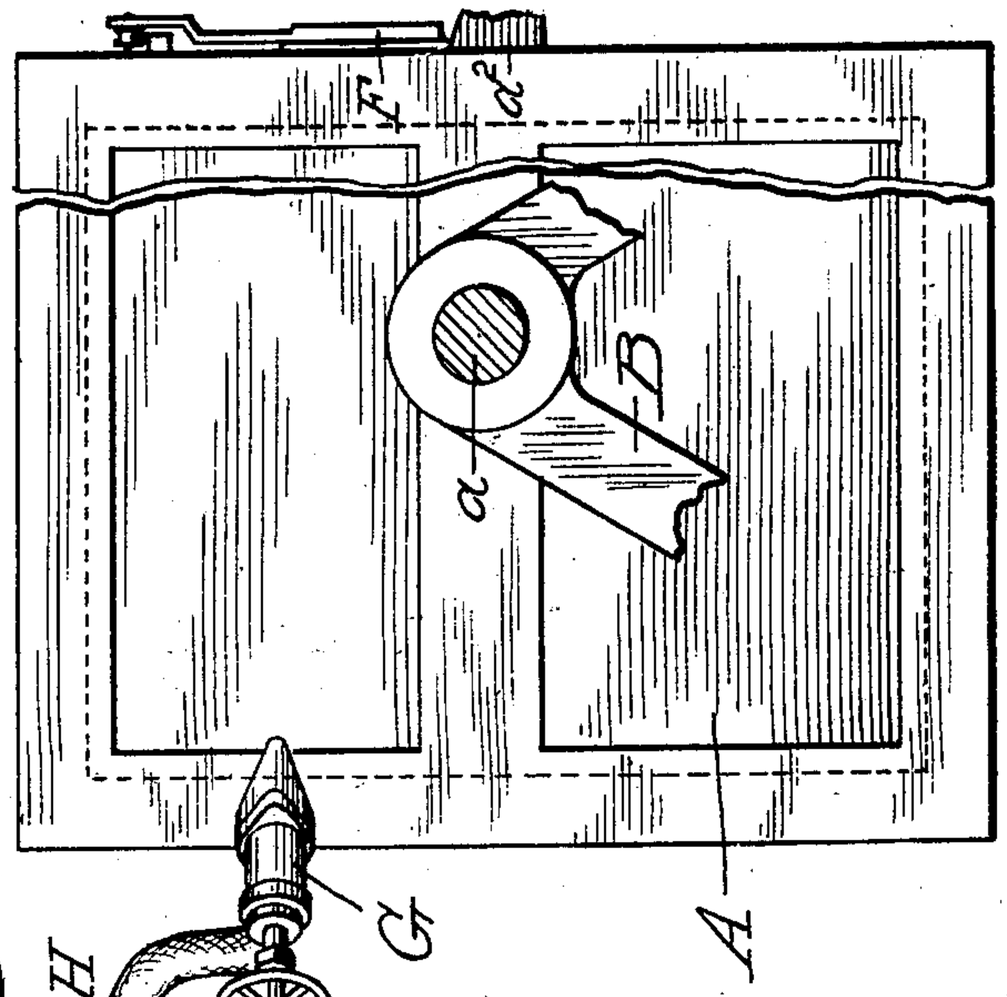
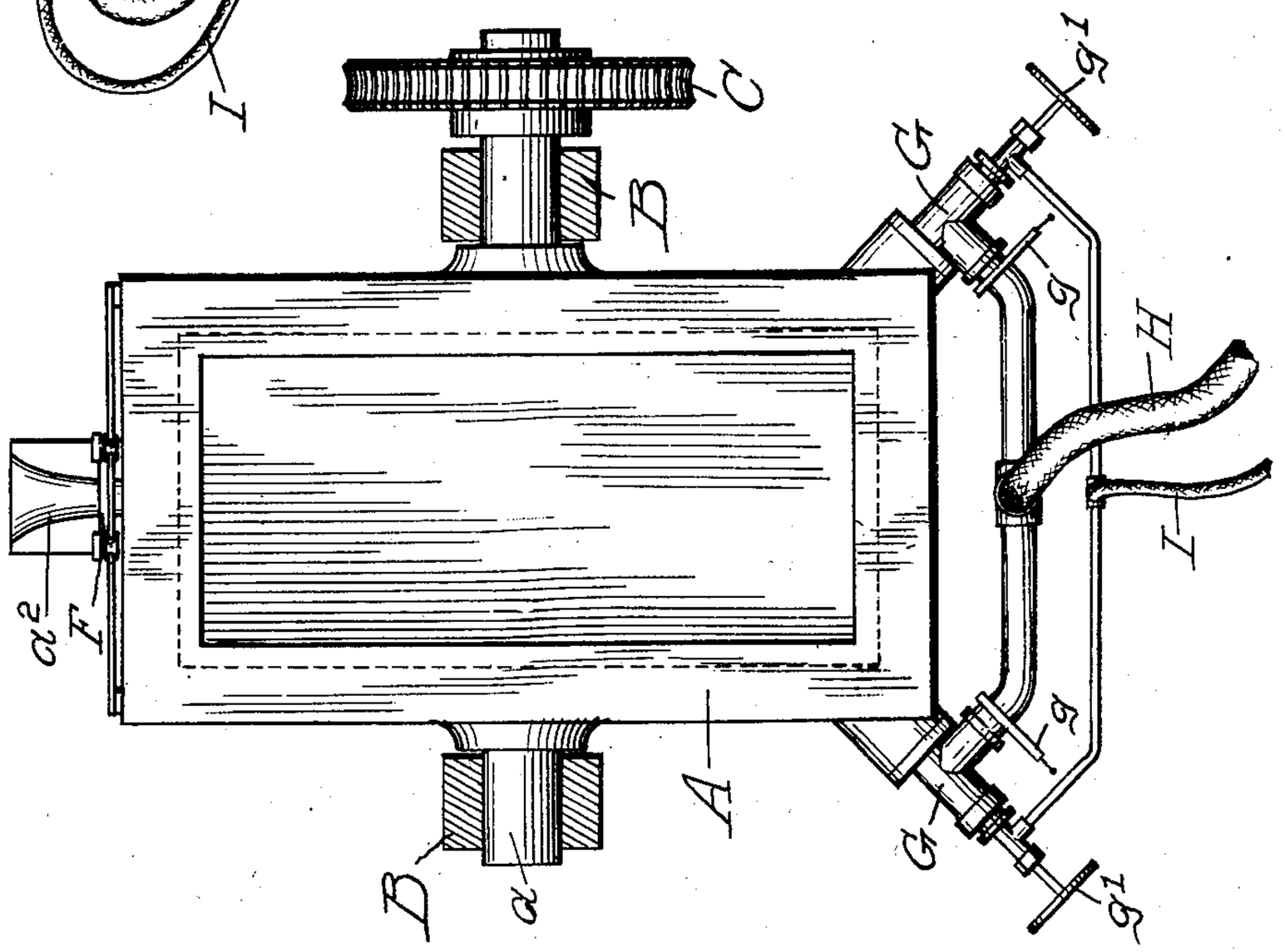


Fig. 3.



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No. 733,931. PATENTED JULY 21, 1903.

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FURNACE FOR MELTING METALS.

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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 6.

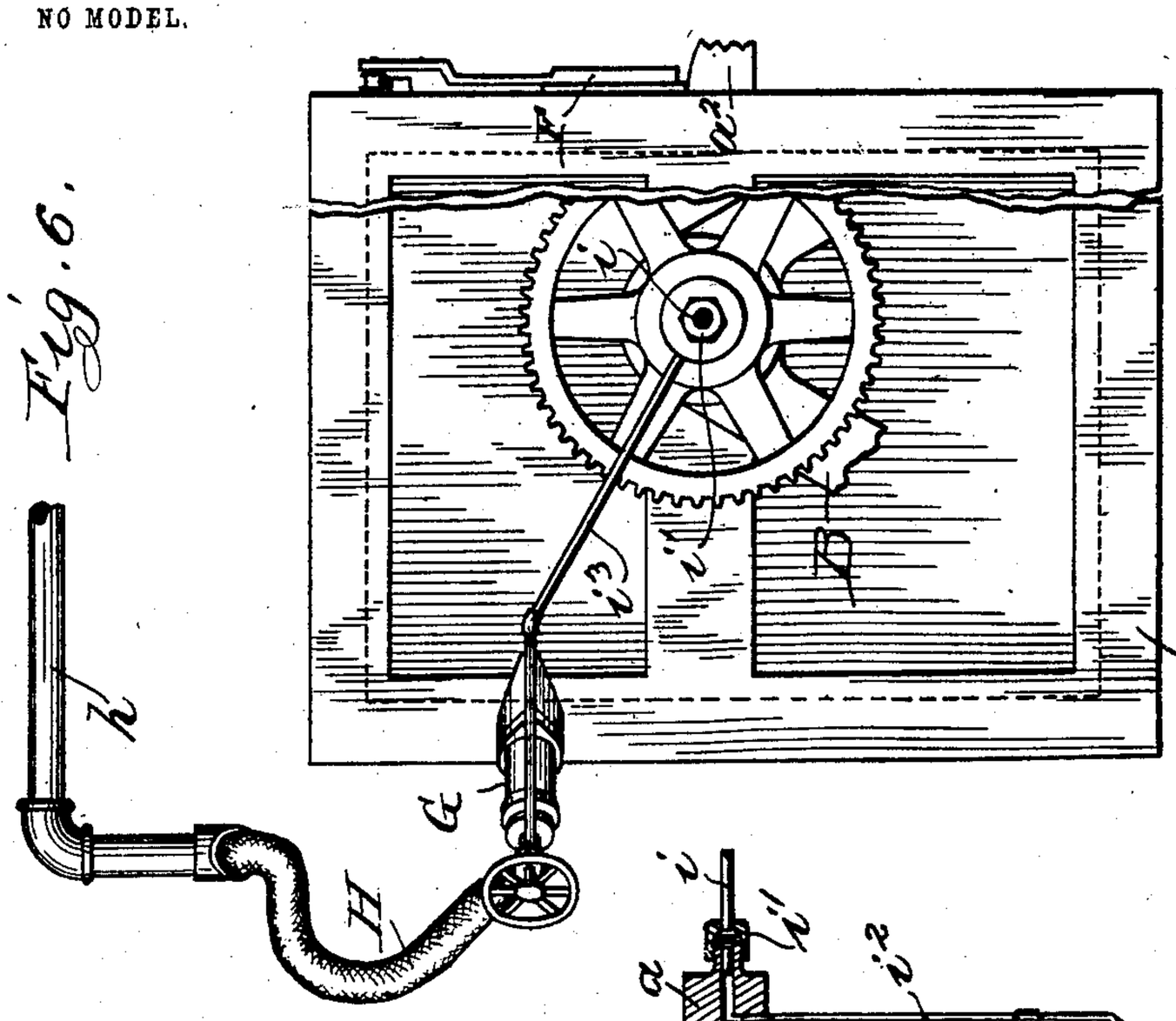
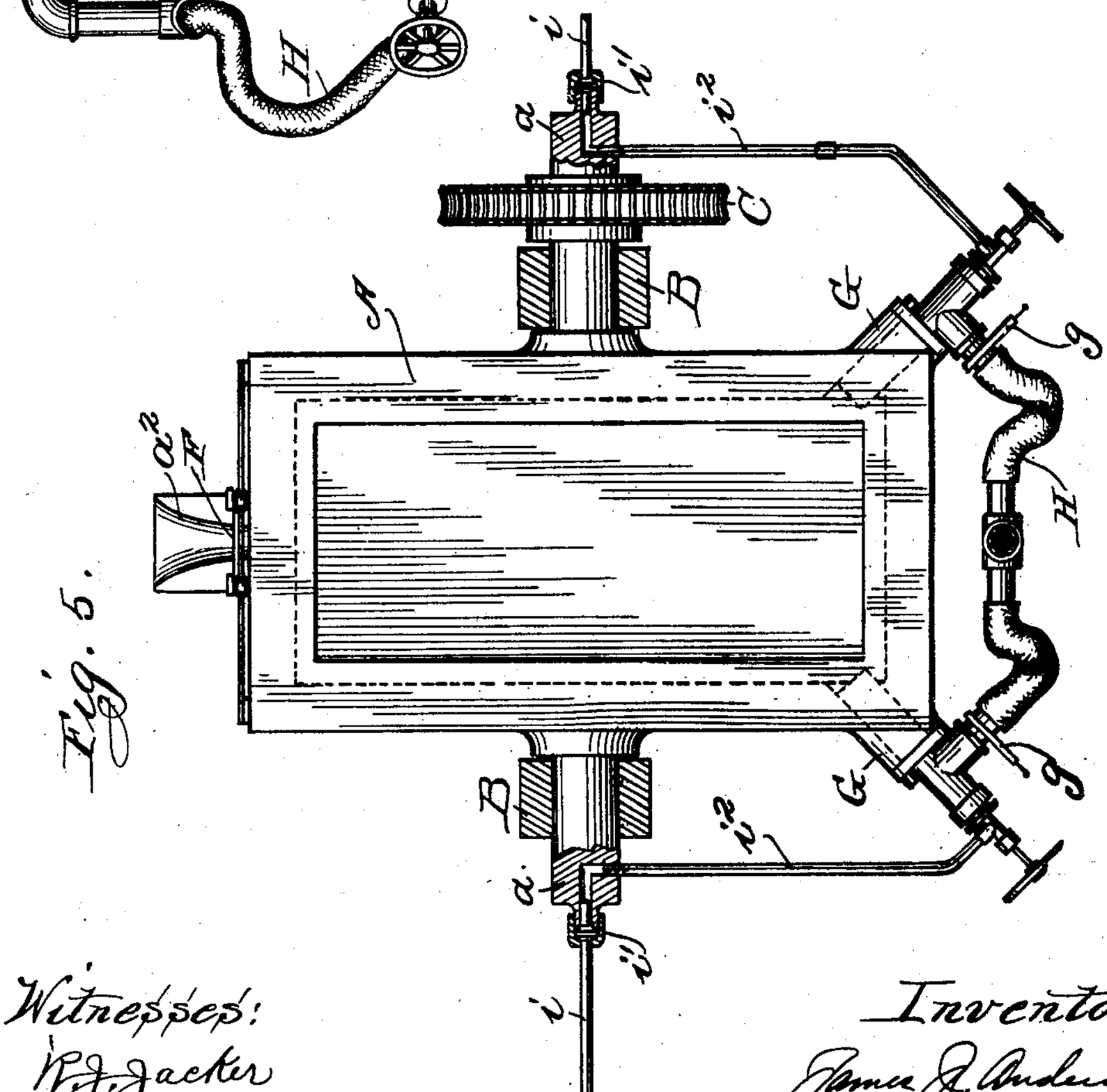


Fig. 5.



Witnesses:
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FURNACE FOR MELTING METALS.

APPLICATION FILED AUG. 19, 1901.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 8.

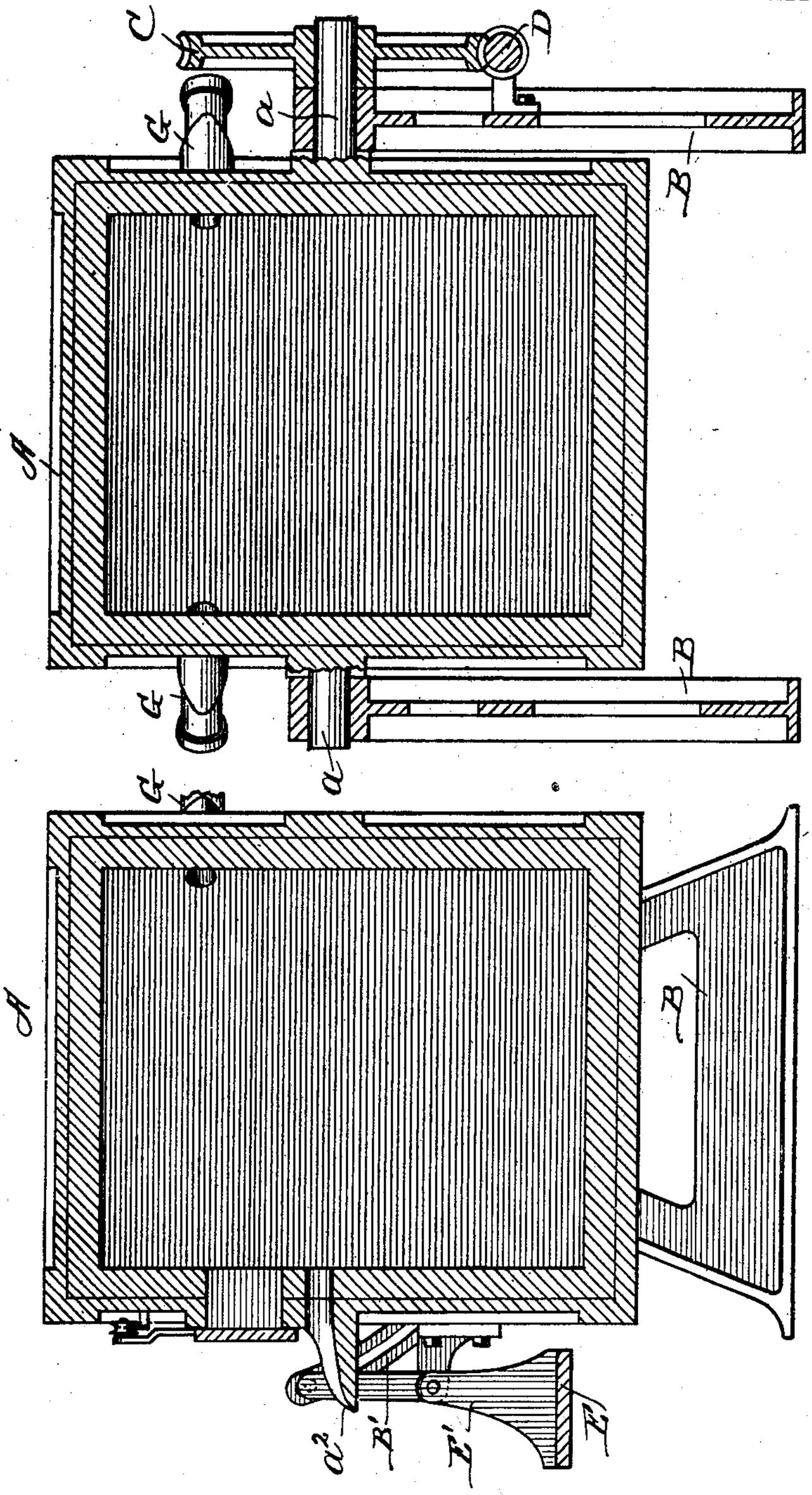

Fig. 7.

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No. 733,931. Patented July 21, 1903.

UNITED STATES PATENT OFFICE.

JAMES J. ANDERSON, OF SOUTH HAVEN, MICHIGAN, ASSIGNOR TO OIL BURNER FURNACE COMPANY, A CORPORATION OF WISCONSIN.

FURNACE FOR MELTING METALS.

SPECIFICATION forming part of Letters Patent No. 733,931, dated July 21, 1903.

Application filed August 19, 1901. Serial No. 72,467. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. ANDERSON, a citizen of the United States, residing at South Haven, in the county of Van Buren and State of Michigan, have invented certain new and useful Improvements in Furnaces for Melting Metal, of which the following is a specification.

This invention relates to improvements in furnaces for melting metal, and more particularly to that class of such devices in which the furnace is pivotally mounted upon trunnions and is designed to be tilted to discharge the metal previously melted therein.

The object of the invention is to provide furnaces of the character referred to with an adjusting shelf or support upon which molds or ladles may be placed in position to receive the molten metal discharged from the furnace and which will automatically maintain itself in a horizontal plane without regard to the angle to which the furnace is tipped, to provide an improved furnace of this character having burners so constructed and arranged as to enable the melting of the metal to be accomplished with more economy and facility and be carried on, if desired, as a continuous process, during which the metal may be maintained at any required temperature for as long a period of time as may be necessary.

To these ends the invention consists in the matters herein set forth, and particularly pointed out in the appended claims, and will be fully understood from the following description of the furnace illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of any suitable tilting furnace provided with a self-adjusting ladle-supporting shelf in accordance with my improvements. Fig. 2 is a front elevation thereof. Fig. 3 is a top plan view of a special form of tilting furnace constructed and arranged with burners for oil or gaseous fuel in accordance with my improvements. Fig. 4 is a side elevation thereof. Figs. 5 and 6 are views similar to Figs. 3 and 4 of a slightly-modified construction. Figs. 7 and 8 are side and front views, respectively, showing the furnace in sectional elevation.

Referring to the self-adjusting supporting-shelf feature of my invention, A designates a tilting furnace of any suitable or desired construction supported on trunnions *a* in an appropriate framework B and provided with any suitable means by which it may be tilted, consisting in this instance of a worm-gear C, secured to one of the trunnions and intermeshing with a worm D, carried on the framework and arranged to be turned by a handle *d*, so that by manipulating said handle the furnace can be tilted to any angle desired. Depending pivotally from brackets *a'* on the front of the furnace is a shelf E, arranged to hang directly below the discharge-spout a^2 of the furnace. This shelf is designed as a support for the ladles, into which the molten metal is turned from the furnace, or for the molds into which the molten metal may be poured directly from the furnace instead of being first turned into ladles, and it is of course necessary that in order to properly support such molds the shelf must maintain the mouth of the mold in substantially constant relation to the spout of the furnace no matter to what angle the furnace is tilted. This is automatically accomplished in my present improvements by connections between the shelf and the frame B, by which the shelf is caused to swing relatively to the furnace as the latter tips in such manner as to be maintained substantially horizontal. To form such connections, the side members E' of the shelf and which suspend it from the brackets *a'* are herein shown as extended upwardly and provided with laterally-projecting studs *e*, which enter curved slots *b* in forwardly and upwardly projecting bracket-arms B' of the frame B. These slots are so shaped that as the ladle is tilted through the various angles which it is adapted to assume the studs *e* will be guided by said slots so as to always occupy a position directly above the shelf-supporting pivots in the brackets *a'*, and the shelf itself will thereby always be held horizontal throughout the entire range of movement of the furnace. It will, however, be understood that while the particular connections thus described for automatically maintaining the horizontal position of the ladle-supporting shelf are appropriate and advantageous my invention is not necessarily confined thereto, but broadly contemplates any

form of parallel motion applicable to this purpose and by which the same result is accomplished; also, that self-adjusting shelves of this character may be applied to large ladles and similar tilting vessels of this class as well as to tilting furnaces, if so desired.

Referring now to the particular construction of furnaces shown in Figs. 3 to 6, inclusive, the same consists of a closed chamber which may conveniently be made substantially rectangular and supported and tilted after the manner more particularly shown in Figs. 1 and 2. The entire interior of the chamber, including its top, is lined with a thick layer of refractory material, and a normally-closed door F for filling the furnace will be provided at a suitable point, herein shown as located at the front of the furnace just above the spout a^2.

The heating of the furnace to melt the metal placed therein is accomplished by burners G, located at the corners of the furnace, conveniently at the rear thereof and converging toward each other, as shown in Figs. 3 and 5. These burners, which may be of any suitable type, are supplied with air through appropriate connections, herein shown as consisting of flexible hose H, which lead to the burners from a conveniently-located air-supply pipe h. In a similar manner the burners may be supplied with oil or gas through flexible hose I, leading from a conveniently-located oil or gas supply pipe i, as shown in Figs. 3 and 4, or the fuel connection may be made through the trunnions, as shown in Figs. 5 and 6, in which the fuel-pipe i is led into ends of the trunnions through stuffing-boxes l', while rigid connecting-pipes l^2 lead from the trunnions to the burners.

The burners are designed to discharge the air and oil spray or gaseous vapor constituting the fuel into the upper part of the furnace above the body of metal therein, the surface of which is never designed to rise above the level occupied by the spout when the furnace occupies its normal untilted position, and they are herein shown as located about midway between this level of the spout and the top of the furnace; but although the combustion thus takes place above the metal the fact that the furnace is almost completely closed serves to melt and maintain it in its desired molten condition until wanted. The temperature to which the metal is brought and maintained can be regulated as desired by varying the action of the burners by means of valves g and g', which control the air and gas or oil inlets of the burners. A furnace thus constructed is particularly designed and intended for the use of crude oil as fuel and is well adapted for foundry-work, in which it renders practicable a continuous melting and pouring operation, as distinguished from the ordinary method, in which the cupola is charged and emptied by successive "heats." Thus it is contemplated that special "pouring-off" times will be done away with and that instead the metal from the furnace will be drained off as and when needed, the temperature of the metal being maintained continuously at the proper pouring-point and the charging of the furnace being accomplished by the throwing in of small masses of pig at such intervals as may be necessary to maintain the supply, but not often enough to seriously chill the body of molten metal remaining therein. In this connection my improved mold-supporting shelf is particularly advantageous, since it enables the metal to be poured into the molds directly from the furnace and without the use of the ladles, into which it is ordinarily first poured, the peculiar mounting of the shelf serving to automatically maintain the necessarily small mouth of the mold in practically constant relation to the end of the spout no matter to what angle the furnace must be tipped to fill the molds. Without this shelf the pouring of the metal from a tilting furnace directly into the molds would be impracticable.

It will be understood that various changes may be made in the structural details of the improved furnace set forth without departing from the broad spirit of the invention claimed; also, that such furnaces may be advantageously employed for the melting of metals generally, as well as for the melting of iron, under any circumstances to which they may be adapted.

I claim as my invention—

1. The combination with a tilting furnace, of a ladle-supporting shelf mounted on and movable therewith, and means for constantly maintaining said shelf in its normal position with reference to the horizontal regardless of the angle to which the furnace is tipped, substantially as described.

2. The combination with a supporting-frame, of a tilting furnace pivotally mounted in said frame, a shelf pivotally suspended from said furnace, and connections between said shelf and frame for constantly maintaining the normal position of the shelf with reference to the horizontal regardless of the angle to which the furnace is tipped, substantially as described.

3. The combination with a supporting-frame, of a tilting furnace pivotally mounted in said frame, a shelf pivotally suspended from said furnace, a slotted bracket on the frame, and an arm secured to the shelf and movably entering the slot on the bracket to constantly maintain the normal position of the shelf with reference to the horizontal regardless of the angle to which the furnace is tipped, substantially as described.

4. A metal-melting furnace comprising a closed chamber imperforate at its top and bottom and provided with laterally-projecting trunnions connected directly to the sides of the furnace about midway between its top and bottom and closed at their inner or furnace-connected ends, a supporting-frame provided with journals which receive the trunnions and

solely support the closed chamber, burners G projecting laterally into the furnace above the body of metal therein but below the top of the chamber, air and fuel pipes leading to these burners, and connections for supplying said pipes in all positions of the furnace, substantially as described.

5. A metal-melting furnace comprising a closed chamber imperforate at its top and bottom and provided with laterally-projecting trunnions closed at their inner or furnace-connected ends, a supporting-frame provided with journals which receive the trunnions and solely support the closed chamber, burners G projecting laterally into the furnace, above the body of metal therein but below the top of the chamber, air and oil pipes leading to these burners, and connections for supplying said pipes in all positions of the furnace, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two subscribing witnesses, this 14th day of August, A. D. 1901.

JAMES J. ANDERSON.

Witnesses:

HENRY W. CARTER,

K. A. COSTELLO.