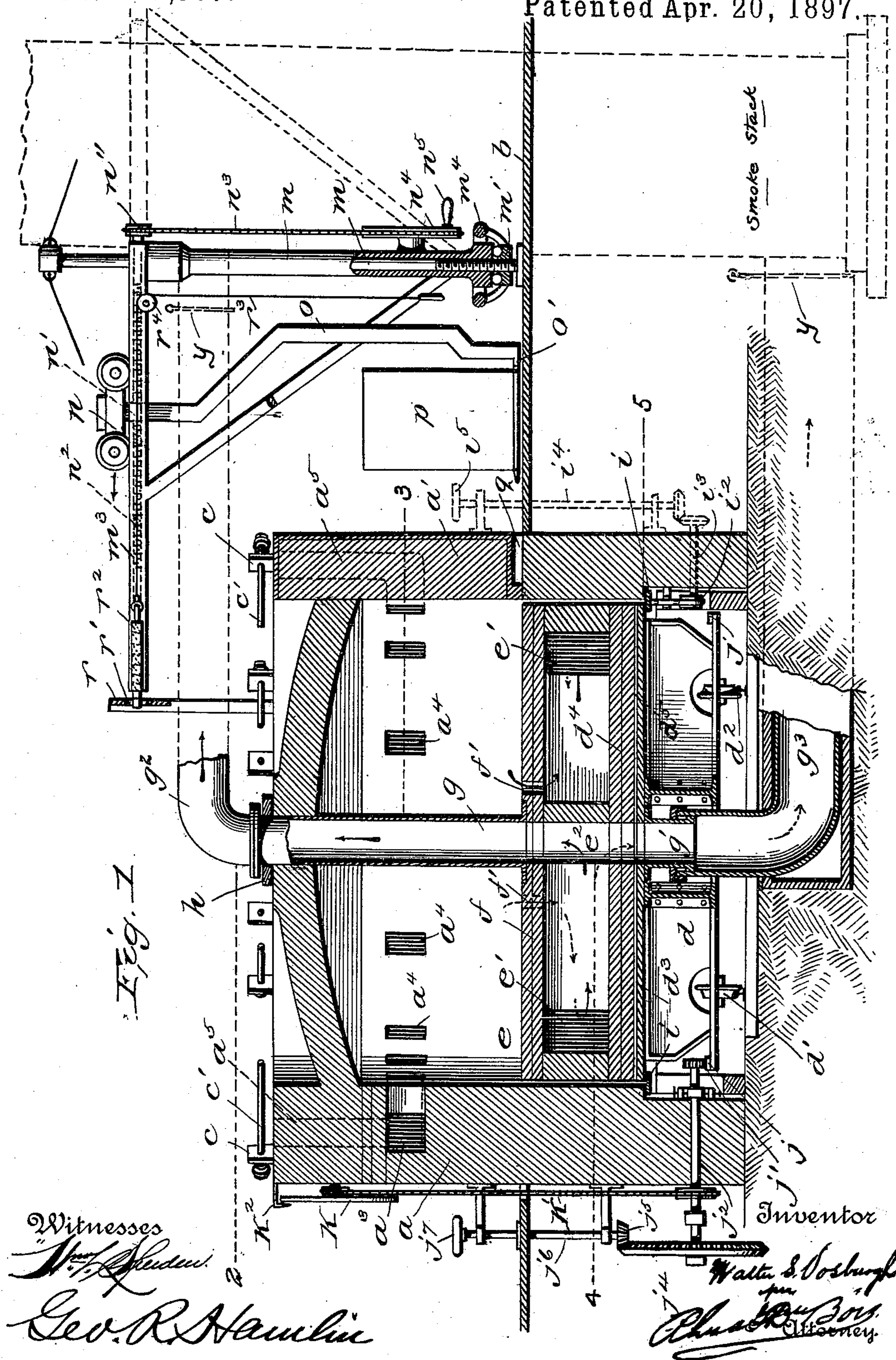


3 Sheets—Sheet 1.

No. 580,997.

Patented Apr. 20, 1897.



(No Model.)

3 Sheets—Sheet 2.

W. S. VOSBURGH.
ROTARY ANNEALING FURNACE.

No. 580,997.

Patented Apr. 20, 1897.

Fig. 2.

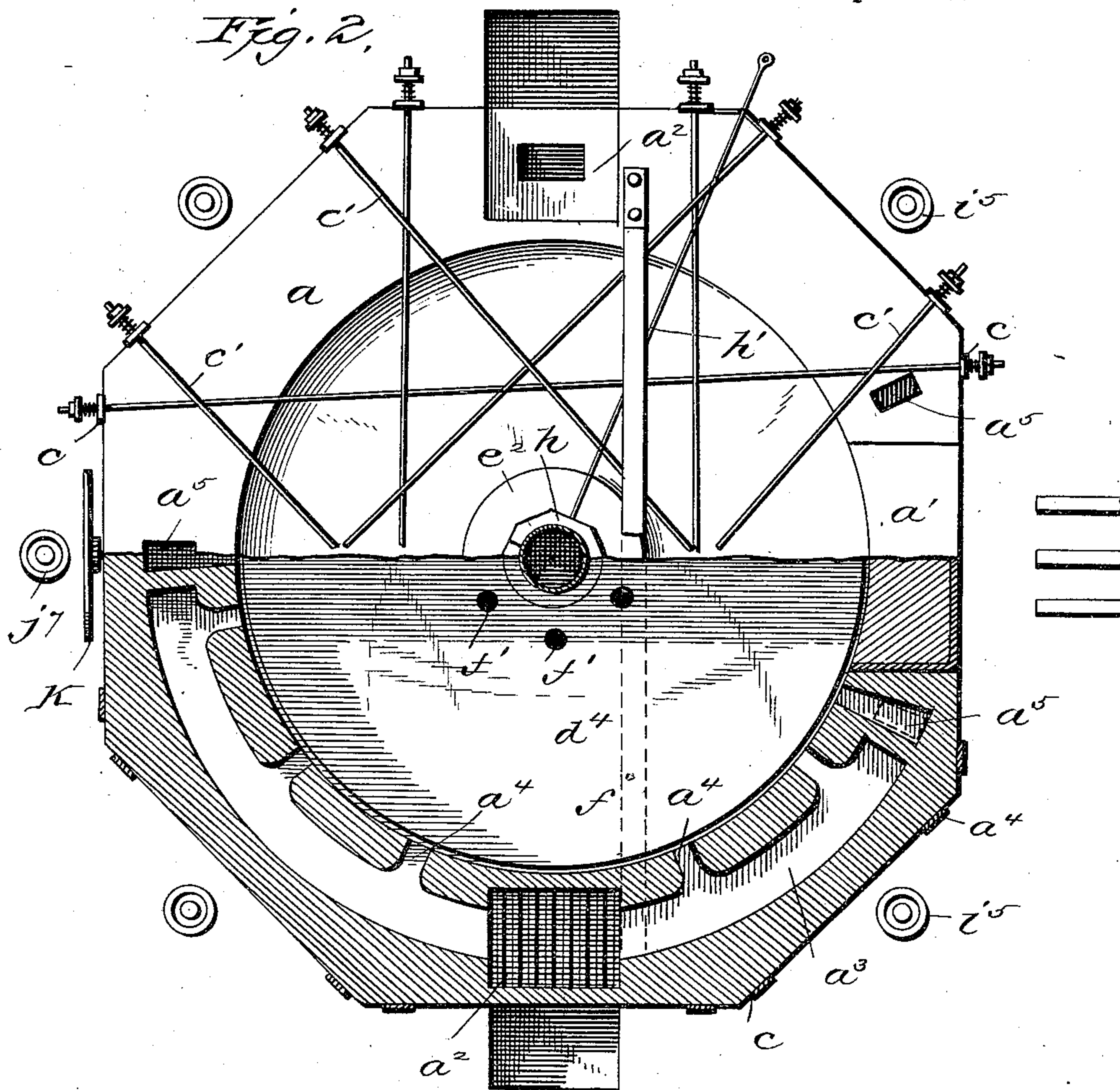


Fig. 5.

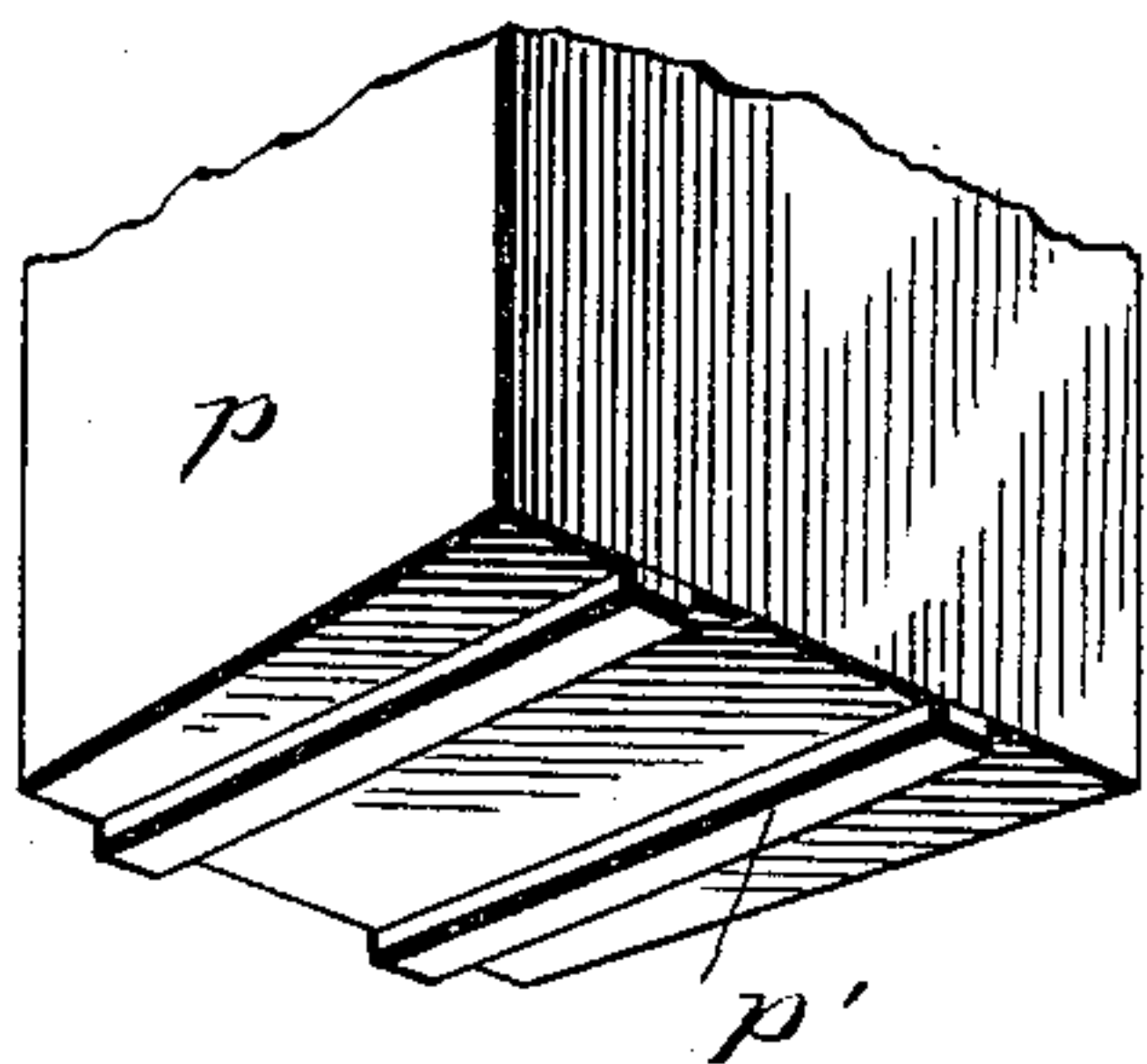
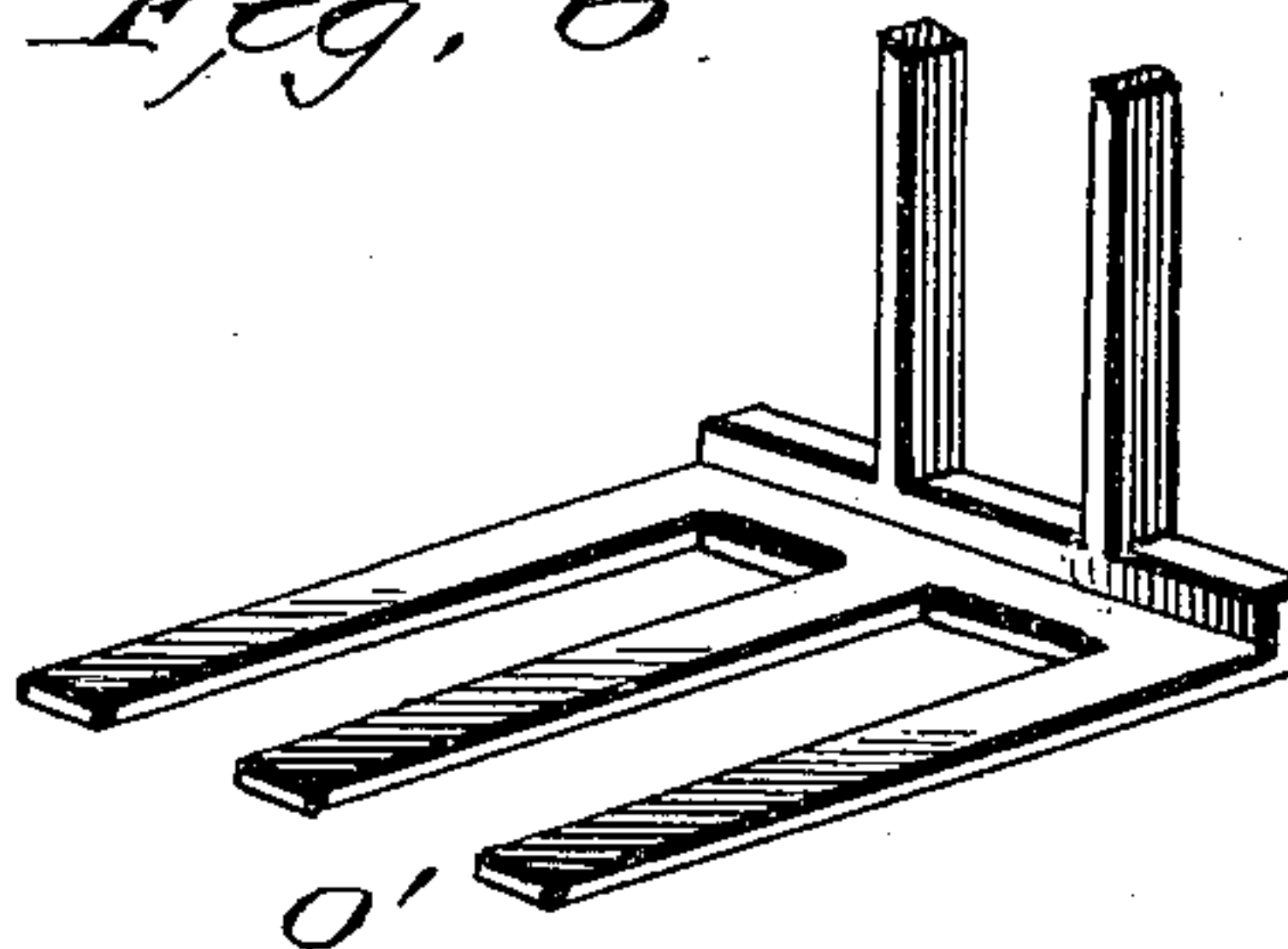


Fig. 6



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 3.

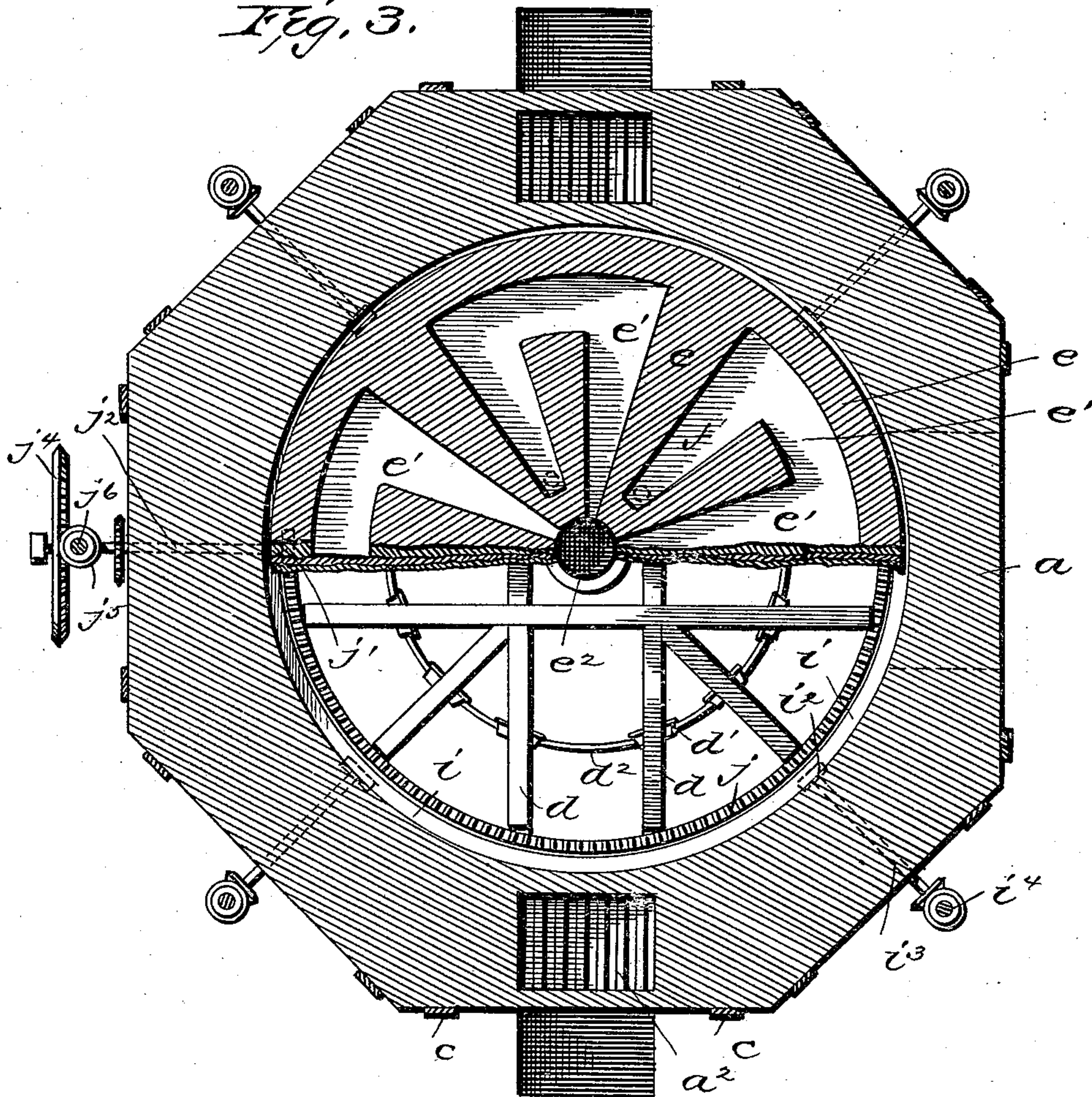
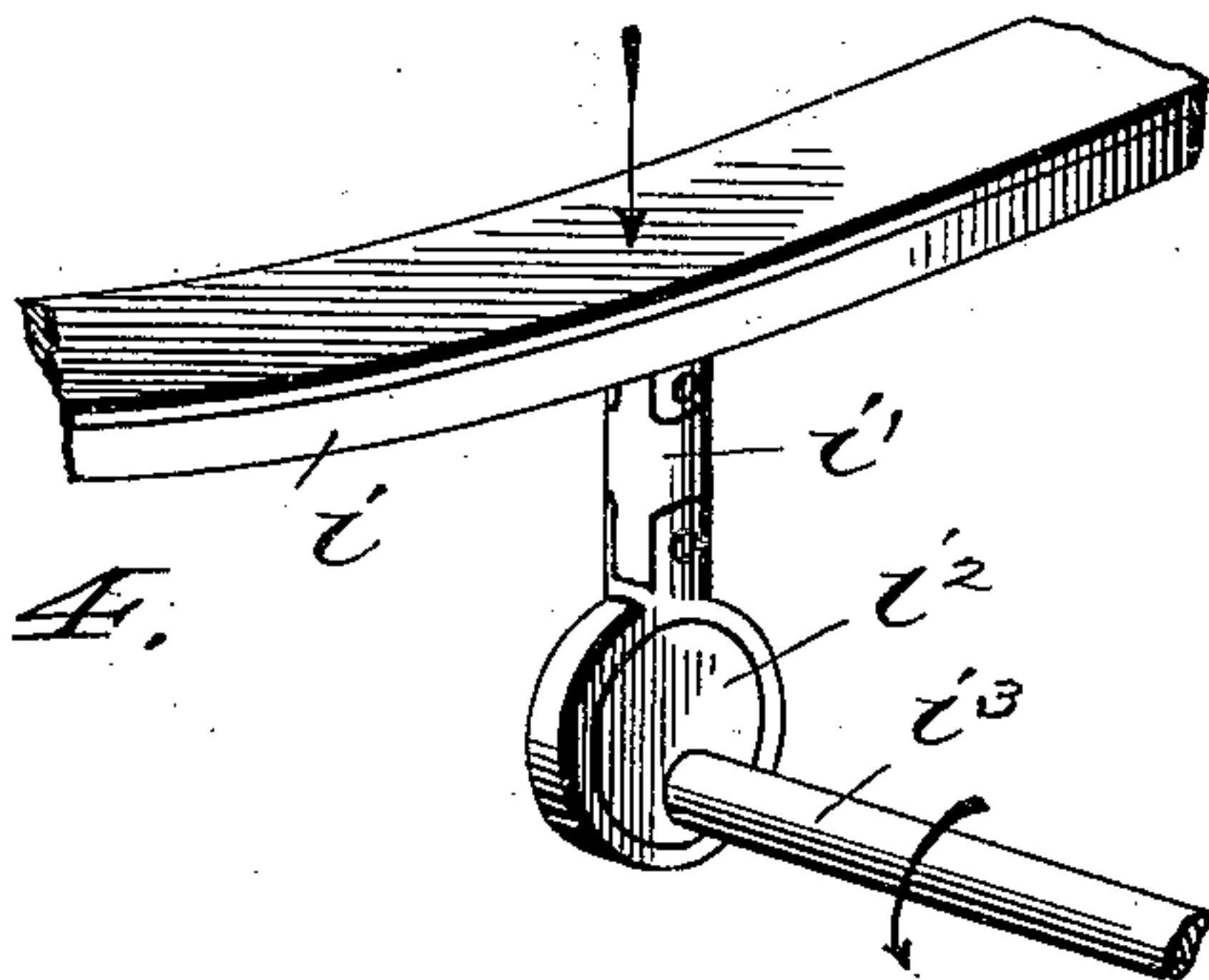


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ROTARY ANNEALING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 580,997, dated April 20, 1897.

Application filed April 19, 1895. Serial No. 546,389. (No model.)

To all whom it may concern:

Be it known that I, WALTER S. VOSBURGH, a citizen of the United States, residing at Deposit, in the county of Broome and State of New York, have invented certain new and useful Improvements in Rotary Annealing-Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

In the means now in vogue for annealing iron the castings to be annealed are first packed in cast-iron pots and the open spaces between the castings in the pots filled with a mineral substance which has been previously treated with certain chemicals. After several pots have been packed in this manner they are placed in the annealing-furnace, the latter sealed up, and the fires lighted. The point which it is necessary for the heat to attain is not reached until about the third day. Consequently the annealing process does not commence until that time, while in my new style the work reaches the necessary heat for annealing in less than ten hours, which, it can be seen, is a decided advantage.

In the old style of annealing-furnace both light and heavy work have to remain in the same length of time and the pots cannot be removed until the fires are drawn, and each pot must be removed in the order in which they were put into the furnace, and the result frequently is that the quality of the light castings is damaged more or less, while perhaps the heavy work is not properly annealed and has to be repacked and go again through the same process.

My invention overcomes the above-noted objection to the present system by providing a movable support for the annealing-pots in the oven and an indicator, in connection with means for moving said support, so that each pot can be definitely located.

My invention provides that a pot may be entered into the furnace at any time and removed at any time. All that will be necessary is to have castings of about the same weight packed in one pot or castings that will

take about the same length of time to anneal. The dial at the rear of the furnace shows the exact location of each pot, so that no mistake may be made in removing them.

The drawings which accompany and form part of this specification illustrate an embodiment of the invention.

Figure 1 shows a general longitudinal section of the complete apparatus. Fig. 2 shows a horizontal section taken on two different planes, as indicated by lines 2 and 3 in Fig. 1. Fig. 3 shows a like section taken on lines 4 and 5 of Fig. 1. Fig. 4 shows a detail of a certain closure. Fig. 5 shows a detail bottom perspective view of one of the annealing-pots. Fig. 6 shows a detail of a certain lifting device.

The letter *a* designates the oven, which is built up of brickwork in the usual or any suitable manner and has a polygonal exterior, whereas its interior wall is circular. The lower part of the brickwork is sunk below the operator's platform *b*, whereas the upper or dome-like part is above said platform and has in one side a door *a'*, adapted to be moved over said platform out of and into closing position. Grated fire-boxes *a²* are provided at opposite sides of the oven, as usual, and semi-circular flues *a³* extend around in the side walls of the oven, said flues leading from the fire-boxes and having branches *a⁴* opening into the oven. Other passages *a⁵* may be formed in the walls of the oven to provide communication between the oven and the atmosphere when it is desired to let out the heated products of combustion.

The walls of the oven are braced by stay-plates *c*, sunk in the ground, and tie-rods *c'*, connecting the upper ends of said plates and extending across the top of the oven.

Within the oven I arrange a turn-table whose top surface is flush with the platform *b*, and as here shown said table is of the following description: There is a foundation of I-beams *d*, securely bolted together after the manner of bridgework and having bearings for flanged wheels *d'*, which run on a circular track *d²*, laid on the bottom of the oven. On the upper side of this bridgework rests a metal plate *d³*, and upon the latter there is a layer of tiles *d⁴*, between which and the metal plate I preferably interpose a sheet of asbestos

d^5 . On the layer of tiles there is built up a tile structure e , forming a number of flues e' of tortuous or circuitous design, each of such flues extending from a point near the inner wall of the structure radially outward and then circumferentially for a short distance and again radially inward, this latter radial part extending through the inner wall of the structure and communicating with a central passage e^2 , extending vertically through the table. Another layer of tiles f , similar to the layer d^4 , extends over the structure e and is formed with orifices f' , affording communication between the heating-space of the oven and the blind ends of the flues e' .

The central passage e^2 communicates by pipes g and g' , fastened to the upper and lower sides of the table, with pipes g^2 and g^3 , leading to a smoke-stack, (indicated by broken lines in Fig. 1,) suitably-constructed joints being provided between the pipes to allow for rotation of the table. Either pipe g^2 or g^3 may be used to conduct the products of combustion to the smoke-stack, each of said pipes having a damper y . In order to make a tight closure where the pipe g issues out of the top of the oven, I provide two semicircular interlocking packing-pieces h , fastened on the ends of rods h' , which extend out to and beyond the sides of the furnace. At all times when the table is not in motion the said packing-pieces are brought up tightly against the pipe g , so as to close the clearance-space between that pipe and the oven.

I further provide for closing the clearance-space between the table and the walls of the oven as follows: A ring made up of a number of segmental plates or strips i is placed below said space, so as to extend across the same all the way around, and each plate is connected by a link i' with the strap of an eccentric i^2 , affixed on a shaft i^3 , which extends through the brickwork and is geared to an upright spindle i^4 , having a handle i^5 above the platform, all as shown in broken lines in Fig. 1. It will be seen that by turning the handle the plates can be moved up or down through the medium of the eccentrics.

The means here shown for turning the table are of the following description: The foundation-work of the table is suitably formed to accommodate a circular rack-bar j , which is engaged by a pinion j' on the inner end of a shaft j^2 , extending through the brickwork and carrying on its outer end a bevel-gear j^4 . This bevel-gear is engaged by a suitable bevel-pinion j^5 on the lower end of a spindle j^6 , which extends above the platform b and carries a handle j^7 for manipulation by an attendant. In connection with said table-turning means I arrange indicating mechanism of the following description: A circular plate K is rotatively supported near the top of the oven at one side and is operatively connected with the shaft j^2 by a sprocket-chain K' , engaging sprocket-wheels on the spindle of said plate and on the said shaft. The circular

plate is a dial, and there is fastened to the brickwork an index-finger K^2 , having a part overhanging the plate.

I shall next proceed to describe the means employed to handle the door of the oven and the annealing-pots.

The letter m designates the fixed post of a crane, which post is here shown as screw-threaded at its lower end for engagement of a nut m' , constituting a step-bearing for the elongated hub or sleeve m^2 of the jib m^3 , said sleeve loosely surrounding the post and resting on balls interposed between its lower end and the nut m' and confined in a raceway formed in said nut. The nut is made with a wheel-like handle m^4 , by which to turn it and adjust the jib vertically for a purpose hereinafter explained. A wheeled carriage or truck n runs on the jib and is formed with nut n' , projecting at one side and engaged by a screw n^2 , journaled in ears on the jib and carrying a sprocket-wheel n'' , connected by a sprocket-chain n^3 with a sprocket-wheel n^4 , supported at the lower part of the sleeve m^2 and having a handle n^5 . It will be seen that by turning the wheel n^4 the truck n will be caused to traverse the jib. A bent arm o depends from the truck and has at its lower end a horizontally-extending tray or carrier o' in the form of a three-tined fork. Each annealing-pot p has ribs p' formed on its bottom and the tines of the fork are designed to extend between said ribs, which are of sufficient thickness to permit of the pots resting on the platform b or table while the tines of the fork are free from the same. The bottom of the oven-door has a similar formation, as shown at q , so that the fork can be run under the door when the latter is to be moved.

A bar r is erected on the top of the oven and has a central vertical slot r' for engagement of a spring-pressed bolt r^2 , carried by the crane-jib, the purpose of such engagement being to lock the jib in position of alignment with the door or with a pot on the table. A cord r^3 , attached to the bolt and carried over a pulley r^4 , provides means for retracting the bolt.

Having now set forth in detail the construction of the apparatus shown, I will summarize its operation.

Assuming all parts to be dormant and under the adjustment shown in Fig. 1 and fires to have been started in the compartments a^2 , the wheel n^4 is turned in a direction to advance the fork o' , and the latter is moved under the door a' . Then by turning the wheel m^4 in a direction to elevate the jib the oven-door is lifted free of the brickwork on which it has been resting. Now the wheel n^4 is again operated and the carriage n moved backward on the jib, carrying with it the oven-door. The jib is swung around after withdrawing the bolt r^2 , and the door is deposited on the platform b by lowering the jib, and the tray o' is withdrawn from under it and then run under a pot p , which is carried

into the oven by operations of the crane similar to those already described, and said pot is deposited on the table within the oven. The tray having been withdrawn from the oven the table is turned by operating the handle j^7 , and the pot is carried past the door-opening. Then another pot is introduced and another, and so on until the table is filled or all the pots desired placed therein. Then the door is replaced. As each pot is introduced into the oven the operator writes or marks on the dial K, where it is overhung by the index-finger K², data concerning the contents of the pot, the time it is placed in the oven, and the time it should remain therein. A complete record of all the pots is thus insured, so that a glance at the dial will convey to the operator the needed information concerning them, thereby obviating the necessity of frequently opening the oven and inspecting the pots.

It will now be seen that my invention provides for great convenience in operating an annealing-furnace and for easily keeping run of the matter under treatment. Moreover, by providing the turn-table with flues I secure a more thorough and uniform annealing of the contents of the pots.

It is to be understood that my invention is capable of embodiment in other forms than that here shown and described.

From the above it can readily be seen that the advantages are, first, saving of at least two days' fuel; second, the saving of at least two days' time in the annealing process, enabling quicker shipments; third, being in continuous operation a pot can be entered every day instead of having to wait for a full furnace, thereby saving several days' time; fourth, less help will be required to handle the same amount of castings; fifth, enabling the making of much better and more even castings, owing to the fact that they can be

removed when properly annealed and not left to burn, whether that time be one day or two weeks.

What I claim as my invention is as follows:

1. In an annealing-furnace, the combination with an oven provided with inlet-flues, of a rotary table having tortuous flues opening into the oven, a central offtake-flue, connections between the tortuous flues and the central flue, and adjustable packing devices to close the space between the table and the oven, substantially as described.

2. In an annealing-furnace, an oven provided with heat-inlet flues, in combination with a rotary turn-table having independent flues therein, and a central flue in communication with the flues in the turn-table, substantially as described.

3. In an annealing-furnace, an oven provided with heat-inlet flues, in combination with a rotary turn-table having radial flues, and a central offtake-flue in communication with the table-flues, substantially as described.

4. In an annealing-furnace, the combination with an oven having inlet-flues, of a rotary table provided with tortuous flues opening into the oven, an offtake-flue in communication with the tortuous flues, and means for rotating the table, substantially as described.

5. In an annealing or like furnace, the combination of an oven, a central tube and a turn-table having circuitous flues communicating at one end with the oven and at the other end with the central tube.

In witness whereof I affix my signature in presence of two witnesses.

WALTER S. VOSBURGH.

Witnesses:

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SILAS I. NORTON.