

W. BÜSCHE.

INDURATING APPARATUS FOR ARTIFICIAL STONE.

No. 598,411.

Patented Feb. 1, 1898.

Fig. 2.

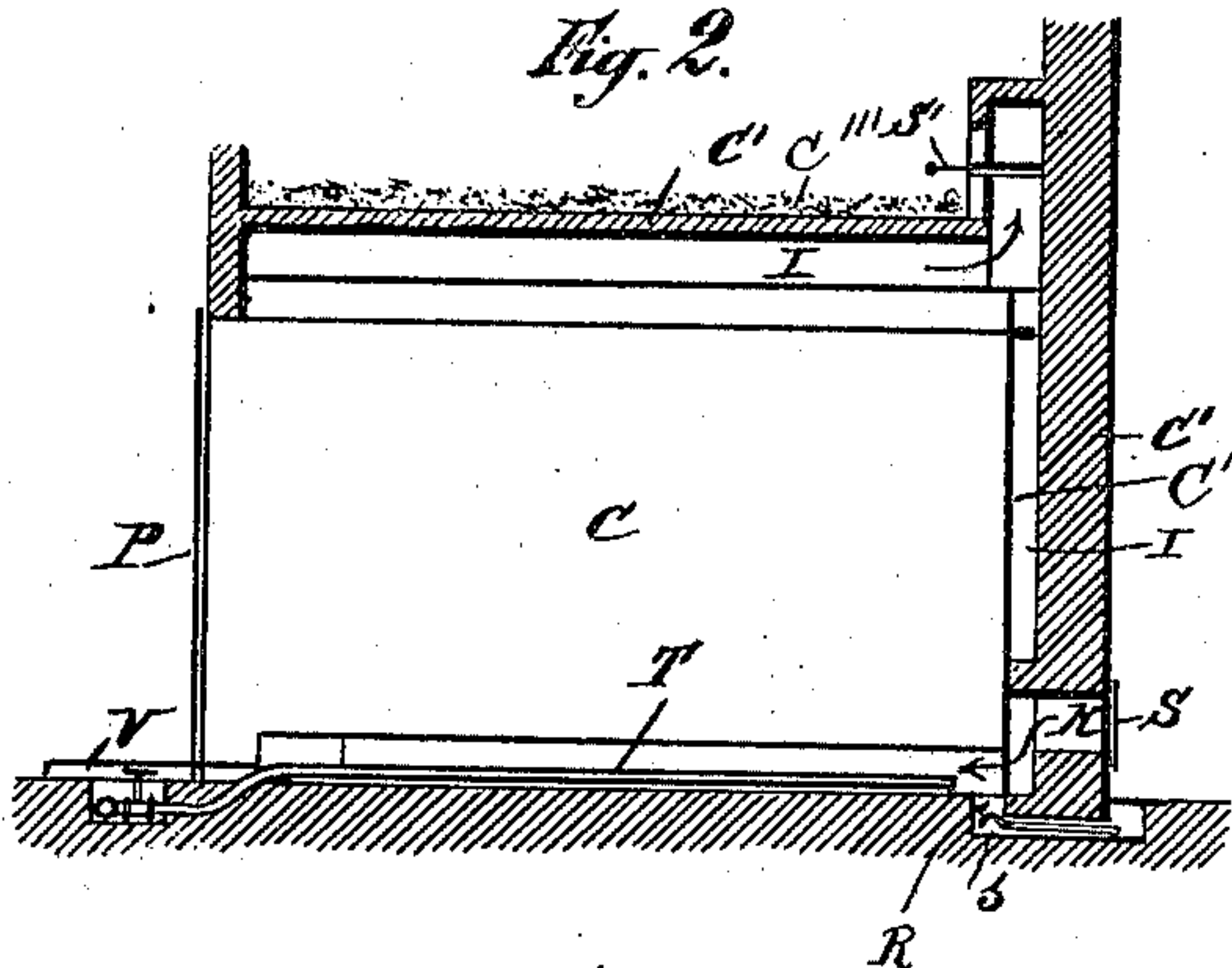


Fig. 3.

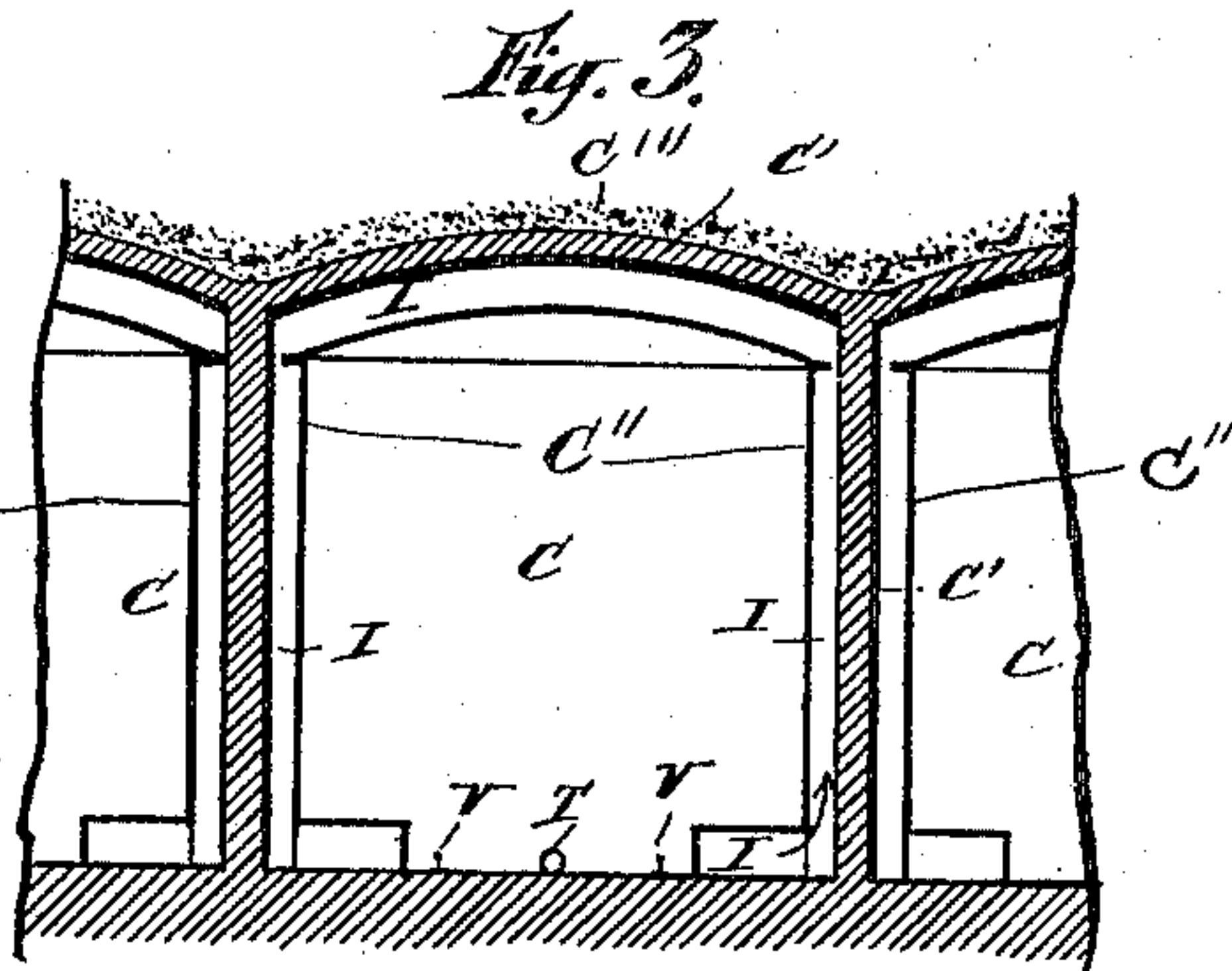


Fig. 1.

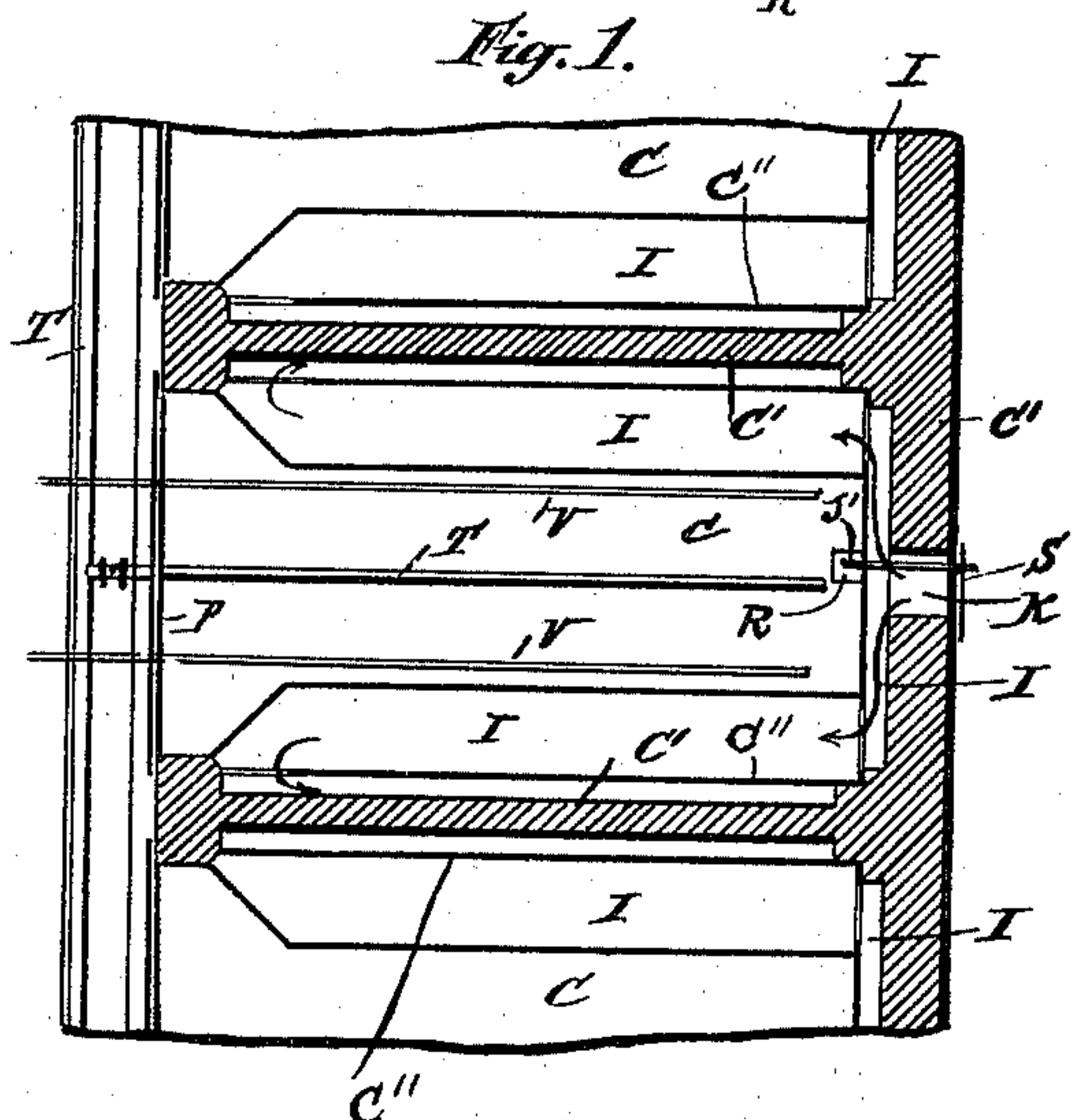


Fig. 7.

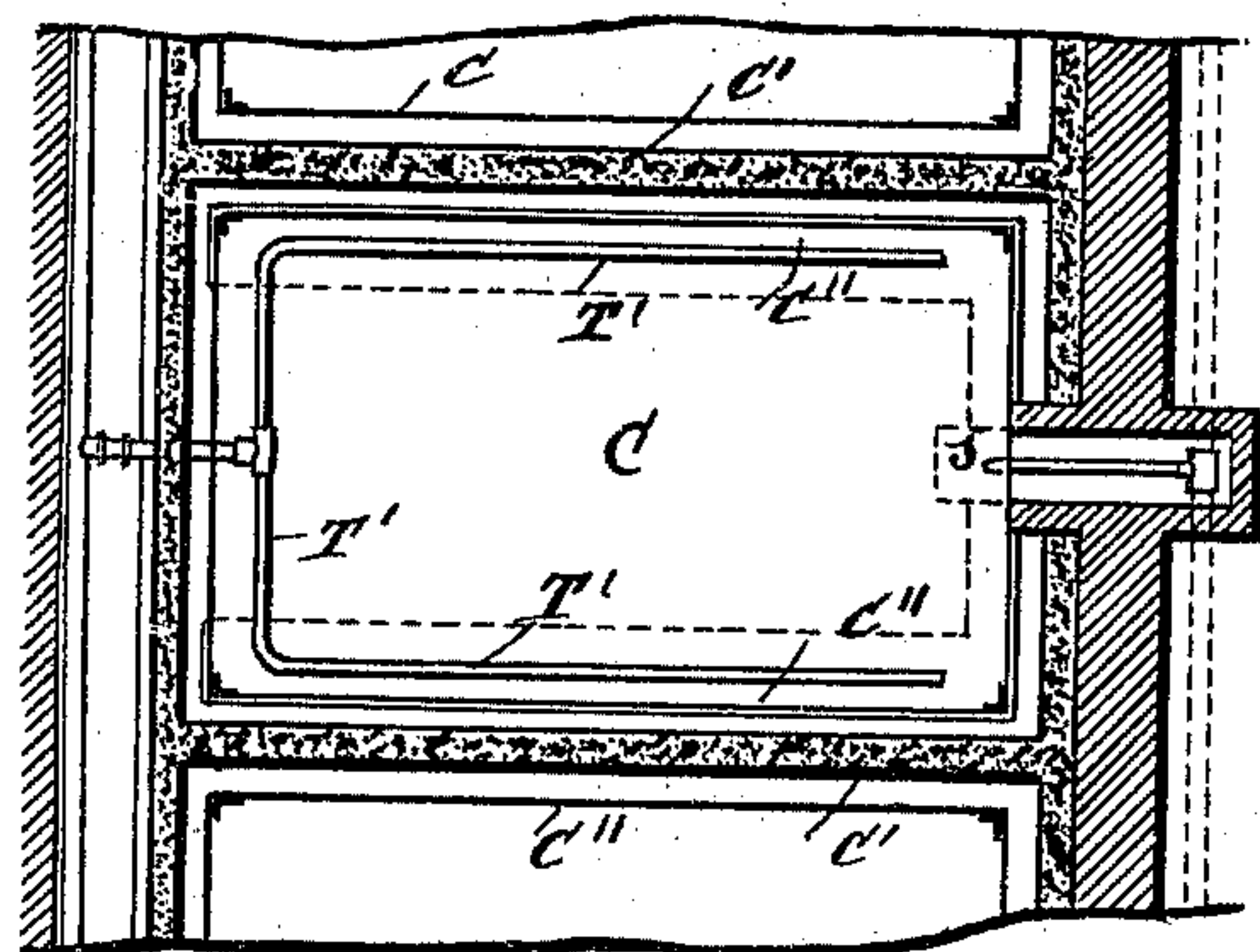
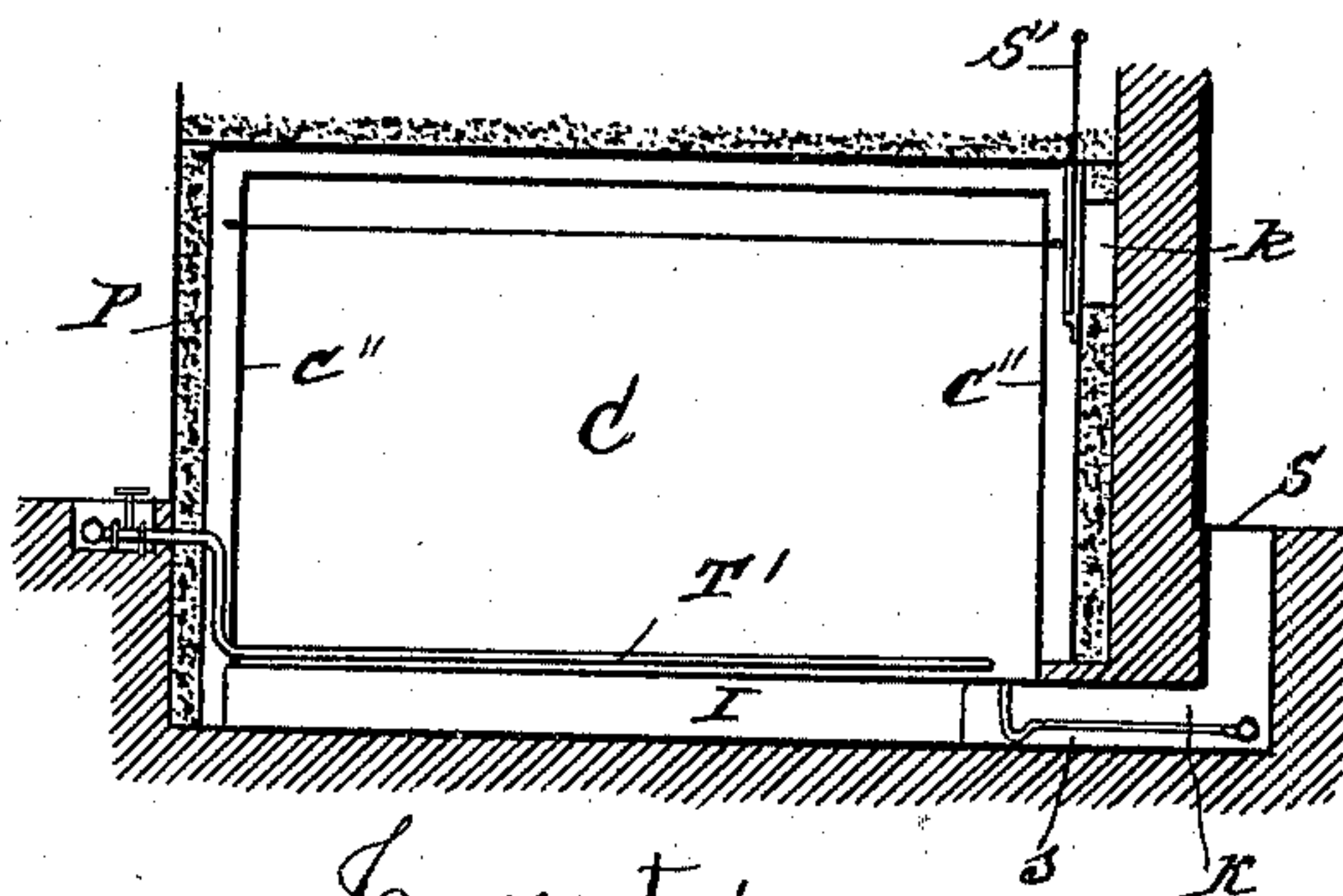


Fig. 8.



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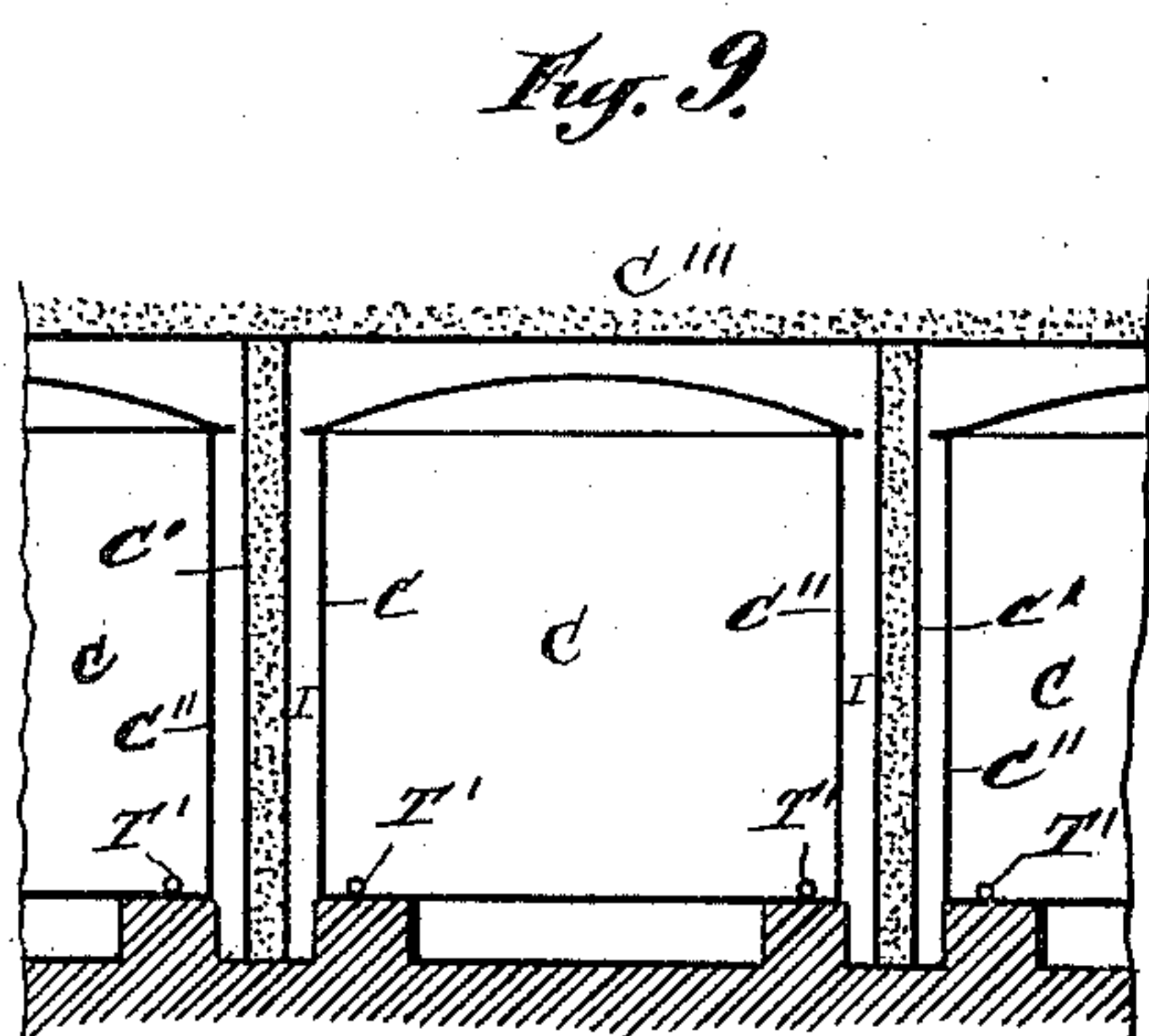
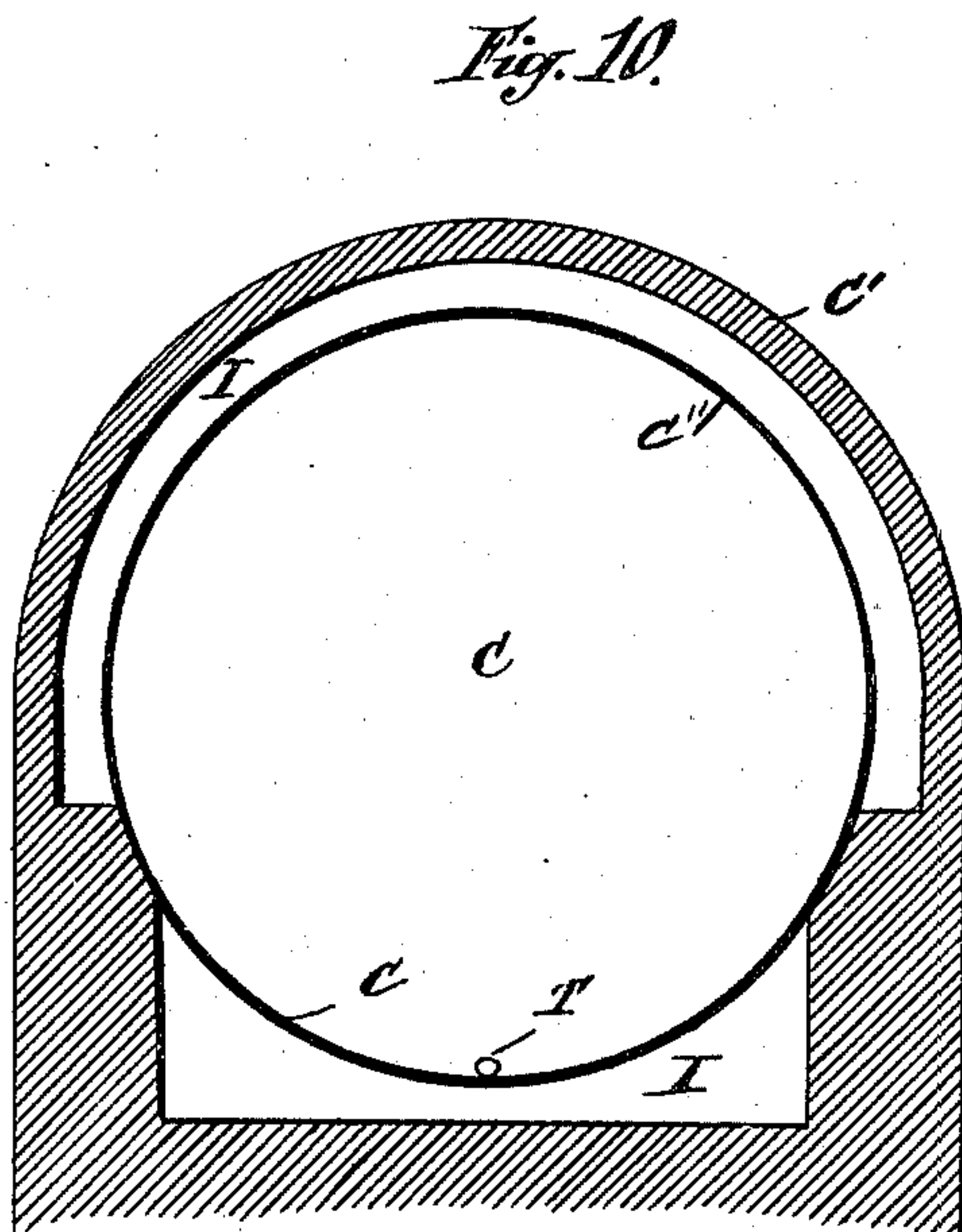
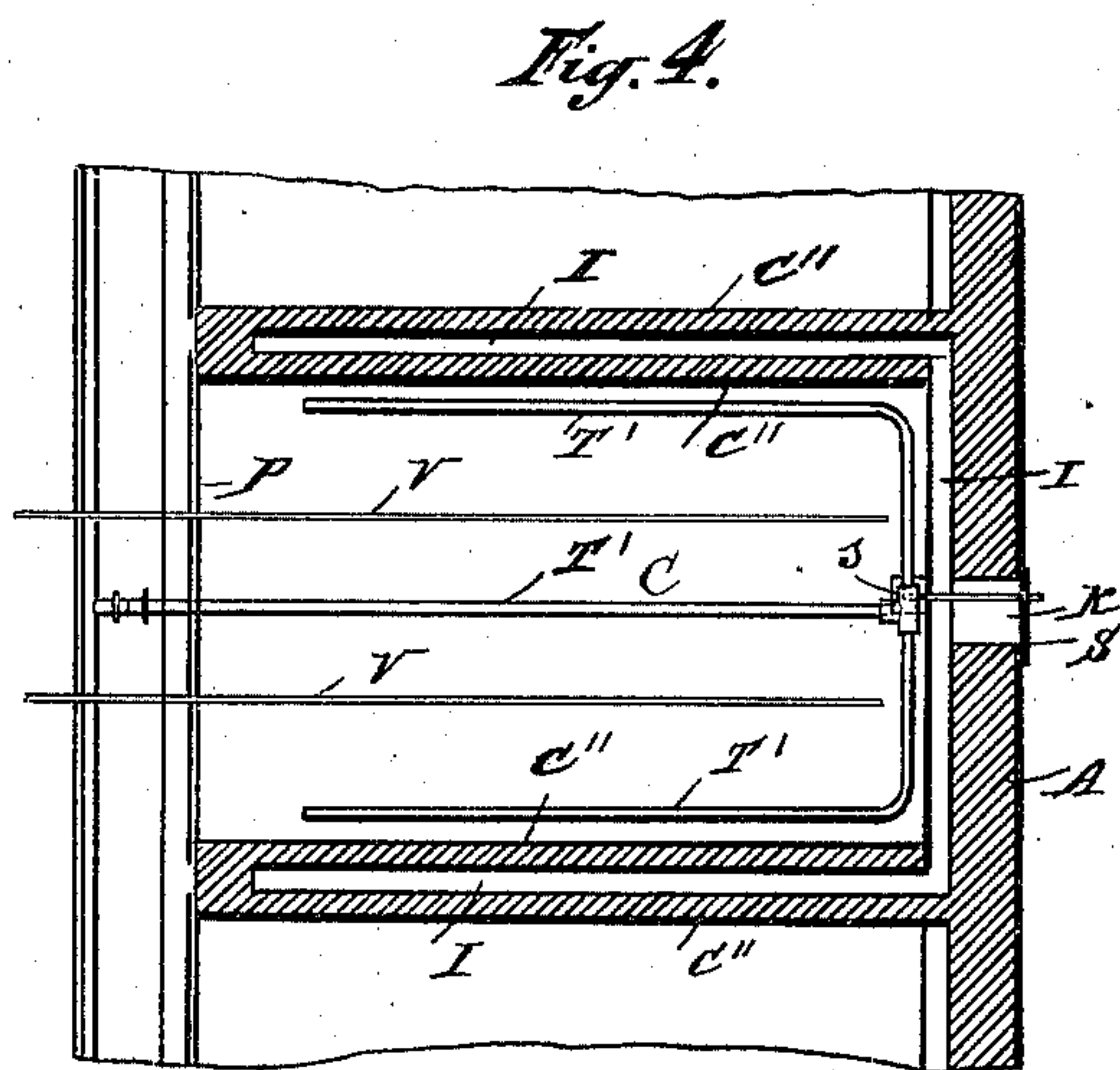
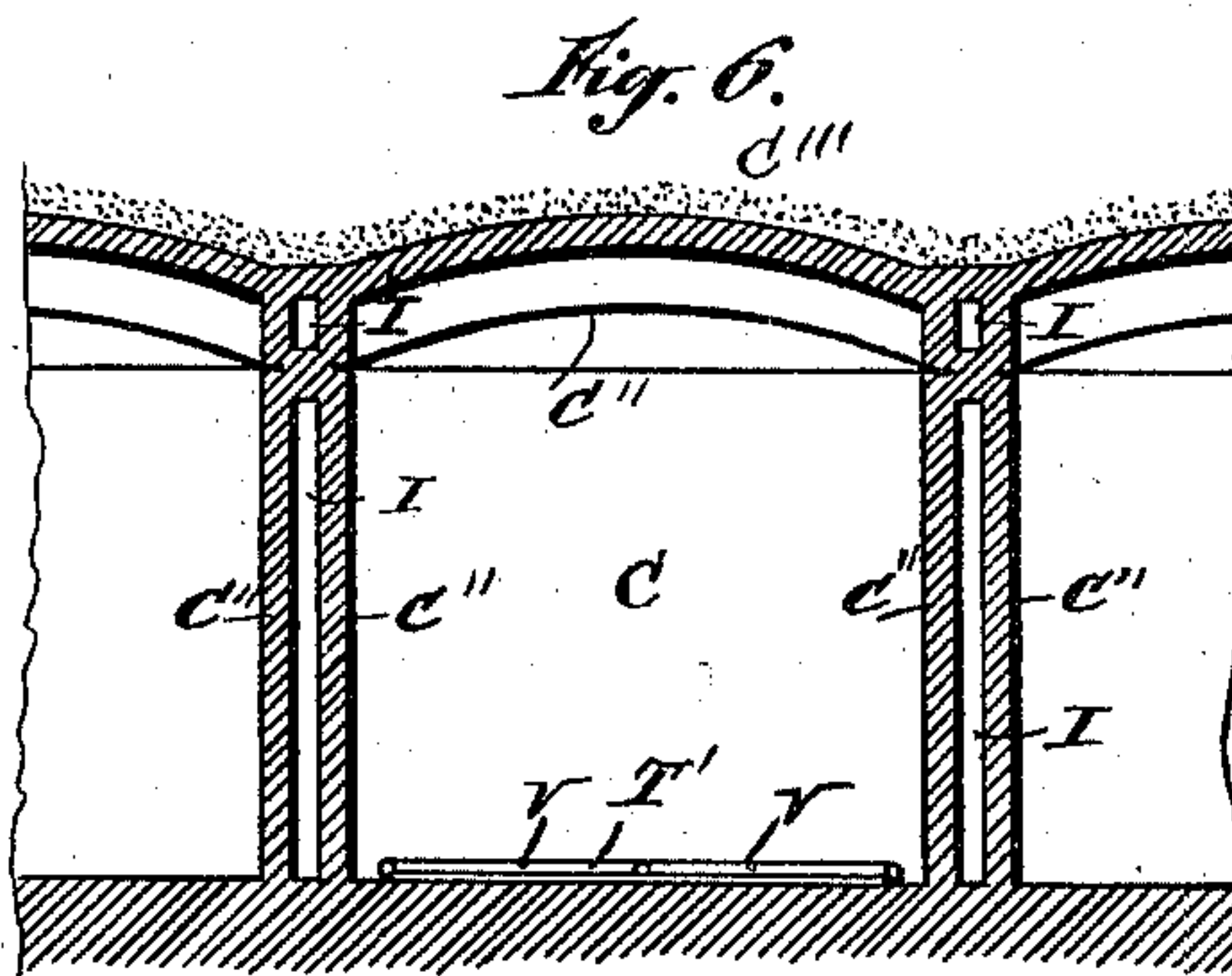
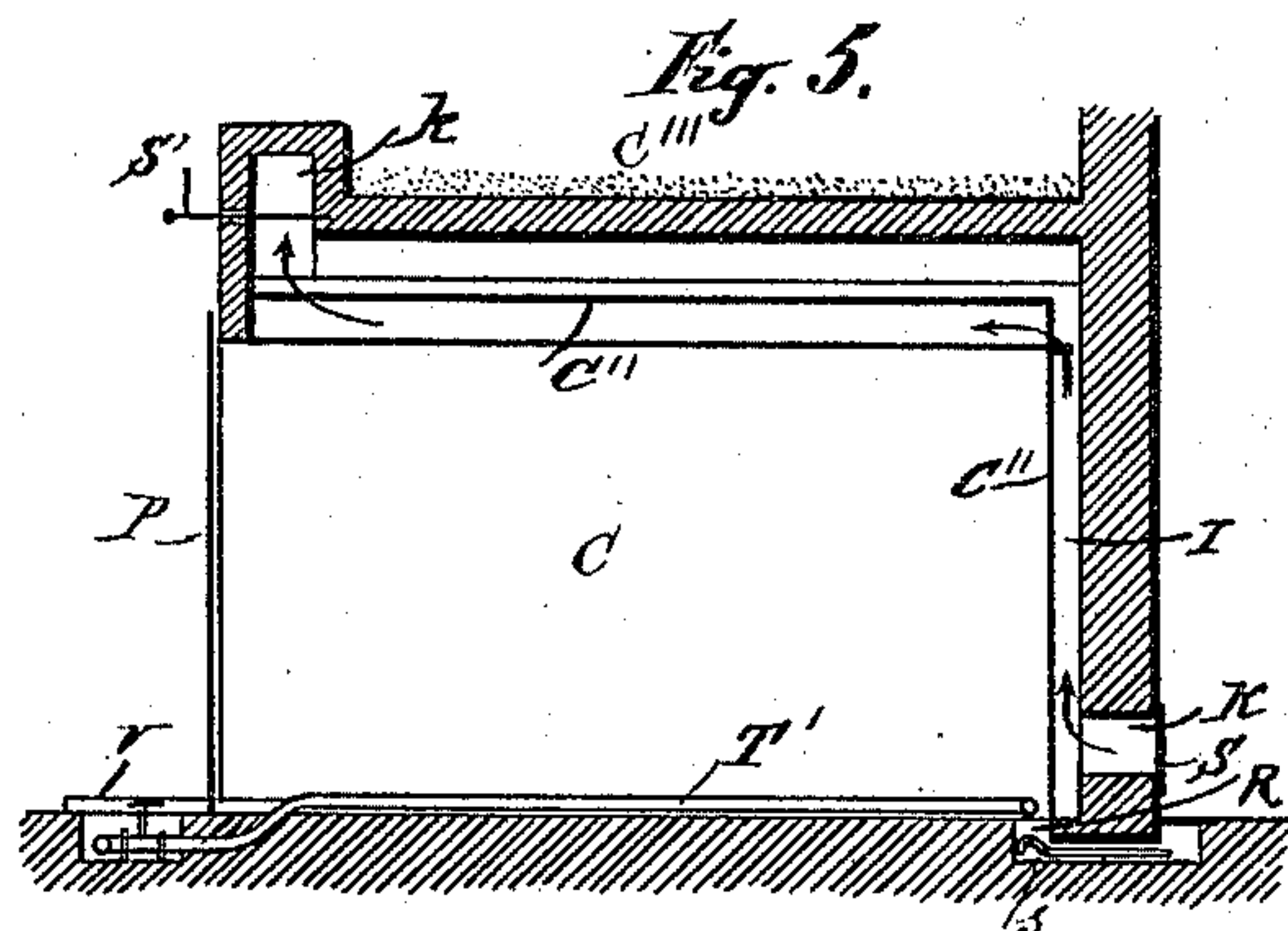
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By Knight Bros
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UNITED STATES PATENT OFFICE.

WILLIAM BÜSCHE, OF NIEUWPOORT, BELGIUM.

INDURATING APPARATUS FOR ARTIFICIAL STONE.

SPECIFICATION forming part of Letters Patent No. 598,411, dated February 1, 1898.

Application filed April 18, 1896. Serial No. 588,190. (No model.) Patented in Italy November 2, 1895, No. 643; in England November 2, 1895, No. 20,770; in Switzerland November 4, 1895, No. 12,274; in Germany November 7, 1895, No. 21,816; in Austria November 8, 1895, No. 4,713, and in Hungary November 9, 1895, No. 79,947.

To all whom it may concern:

Be it known that I, WILLIAM BÜSCHE, manufacturer, a subject of the King of Belgium, and a resident of Nieuwpoort, in the Kingdom of Belgium, have invented certain new and useful Improvements in Indurating Apparatus for Artificial Stone, (for which patents have been obtained in Italy, No. 643, of certificate dated November 2, 1895; in Great Britain, No. 20,770, dated November 2, 1895; in Switzerland, No. 12,274, dated November 4, 1895; in Germany, No. 21,816, of certificate dated November 7, 1895; in Austria, No. 4,713, dated November 8, 1895, and in Hungary, No. 79,947, of certificate dated November 9, 1895,) of which the following is a full, clear, and exact description.

My invention relates to a special construction of indurating apparatus for the manufacture of artificial stone, based on the treatment of a mixture of sand or other stone-like material and of chalk as a binding agent, with hot water or steam, the apparatus being characterized by a construction whereby the heat developed by the hot water or steam is distributed uniformly in the mass of stone, while it enables a refrigerating medium to be subsequently circulated around the chamber or heater with a view to cooling the same in a manner at once more rapid and more regular than in the usual apparatus.

When the treatment of the mass—that is, the baking of the same with hot water or steam, whether under pressure or not—takes place in the interior of an ordinary metallic heater, the formation of the stone is not only not uniform, but even very incomplete, for the reason that the hot water or vapor is cooled in immediate proximity to the walls thereof in such manner that the center of the stone receives an imperfect treatment. In order to obviate this difficulty, use was first made of an expedient consisting in covering the heaters with a heat-insulating material, and to increase the effect and with a view to obtaining better results the chambers or heaters themselves have been constructed of a suitable heat-insulating material. Thus if this construction had a better effect on the baking of the stone it involved, on the other

hand, another difficulty, which consisted in such a retardation of the cooling (even if the apparatus were opened at one side) on account of the heat-insulating walls acting as accumulators of heat that the quality of the stone resulting therefrom is considerably injured thereby. In order to obviate in a practically radical manner these difficulties, the chambers or heaters (at variance with any known construction) are constructed in two separate envelops, of which one—that is, the heater receiving the mass or mixture—is of a heat-conducting material, of sheet-iron, for example, while the other is formed of heat-insulating material, these two chambers being inserted one into the other in such manner that between the walls of the two chambers a space is reserved throughout their whole extent. If now there is introduced into the interior chamber hot water or steam to raise the mass to the desired temperature, the free intermediate space is hermetically closed, so that the air therein is raised to the temperature of the heater, and thus prevents the cooling of the walls of the heater during the heating operation. On the other hand, to establish uniform and rapid cooling after completion of the baking it suffices to simply open certain registers closing the intermediate space and to admit and circulate therein cold air, which removes the heat in its exit, and thus causes a regular cooling in a short time. If it is desired to accelerate the cooling, it suffices to admit colder air—as from a cellar, for example—which results in the stones becoming much better looking and harder. It is impossible to obtain a similar regular cooling with the ordinary apparatus, even if they are placed in the open air, because the layer in immediate contact with the walls always remains hot and seldom renews itself, especially if the heater is erected, as customary, in a closed shed.

In the accompanying drawings I represent several variations of my improved indurating apparatus, in which—

Figure 1 is a horizontal section of an arrangement of several contiguous chambers heated by steam having envelops of heat-insulating material. Fig. 2 is a longitudinal

section thereof. Fig. 3 is a transverse section of the same. Fig. 4 is a horizontal section of an analogous arrangement of baking-chambers having lateral partitions and a heat-insulating material as an exterior envelop. Fig. 5 is a longitudinal section thereof. Fig. 6 is a transverse section of the same. Fig. 7 is a horizontal section of an analogous arrangement of heaters for heating with hot water. Fig. 8 is a longitudinal section thereof; Fig. 9, a transverse section of the same. Fig. 10 is a transverse section of a modification with cylindrical heater for heating with steam under high pressure.

Referring to Figs. 1, 2, and 3, C is the inner chamber, having good conducting-walls C'', which is inserted in the outer chamber I, having insulating-walls C'. On the base or floor common to both chambers is placed a railway V, on which can travel the cars (not shown) which carry the perforated molds containing the mass to be petrified, so as to facilitate the introduction of the same into the chamber. Between the rails is placed a pipe T, perforated throughout its circumference, by which is admitted the steam required to heat the chamber so as to bake the mass. The water of condensation accumulates in the conduit R, from which it is removed by the siphon s. The outer chamber is covered with a layer of poor conducting material C''', and the entrance is hermetically closed by a door P, of suitable construction. When the baking is complete, the external air is, by drawing back the lower register S, admitted through the opening K to the bottom of the chamber in the intermediate space or outer chamber I, which extends partly underneath the inner chamber from the two sides by the elevation of the base, as shown in Fig. 3. The air or other cooling medium then circulates around the wall C''' of the inner chamber C in the direction indicated by the arrows and escapes through the open upper register S', carrying off the disengaged heat through the upper opening k.

The arrangement shown in Figs. 4, 5, and 6 is distinguished from the preceding only in the construction of the baking-chamber C with hollow walls, of cement or other material—such as hydraulic clay, &c.—all the rest being the same as above.

Referring to Figs. 7, 8, and 9, I have represented another modification wherein the heating is done by hot water. In this case the mass is introduced into the sheet-iron casing C'', having a chamber C, and the hot water is admitted by two pipes T' T', at the bottom from which it rises, soaking the mass until total immersion is effected. All the rest is accomplished as above for the cooling by air circulating around the casing C'' of the chamber or reservoir C, as described for the two above cases.

When it is desired to effect the baking by steam under high pressure, the chamber is made in the form of a cylindrical heater, in the interior of which the steam is admitted, the rest of the operation being accomplished as above. This arrangement is represented without the other accessories in Fig. 10.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

An indurating apparatus for artificial stone comprising an inner casing providing a baking and cooling chamber, an outer casing providing a cooling-chamber surrounding the inner casing and having a lower opening for the admission of the cooling medium, and an upper opening through which the cooling medium passes out, registers for closing and controlling the passage of the cooling medium through the lower and upper openings, the perforated steam-pipe located in the inner chamber, and the conduit for the removal of the water of condensation; substantially as described.

WILLIAM BÜSCHE.

Witnesses:

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GREGORY PHELAN.