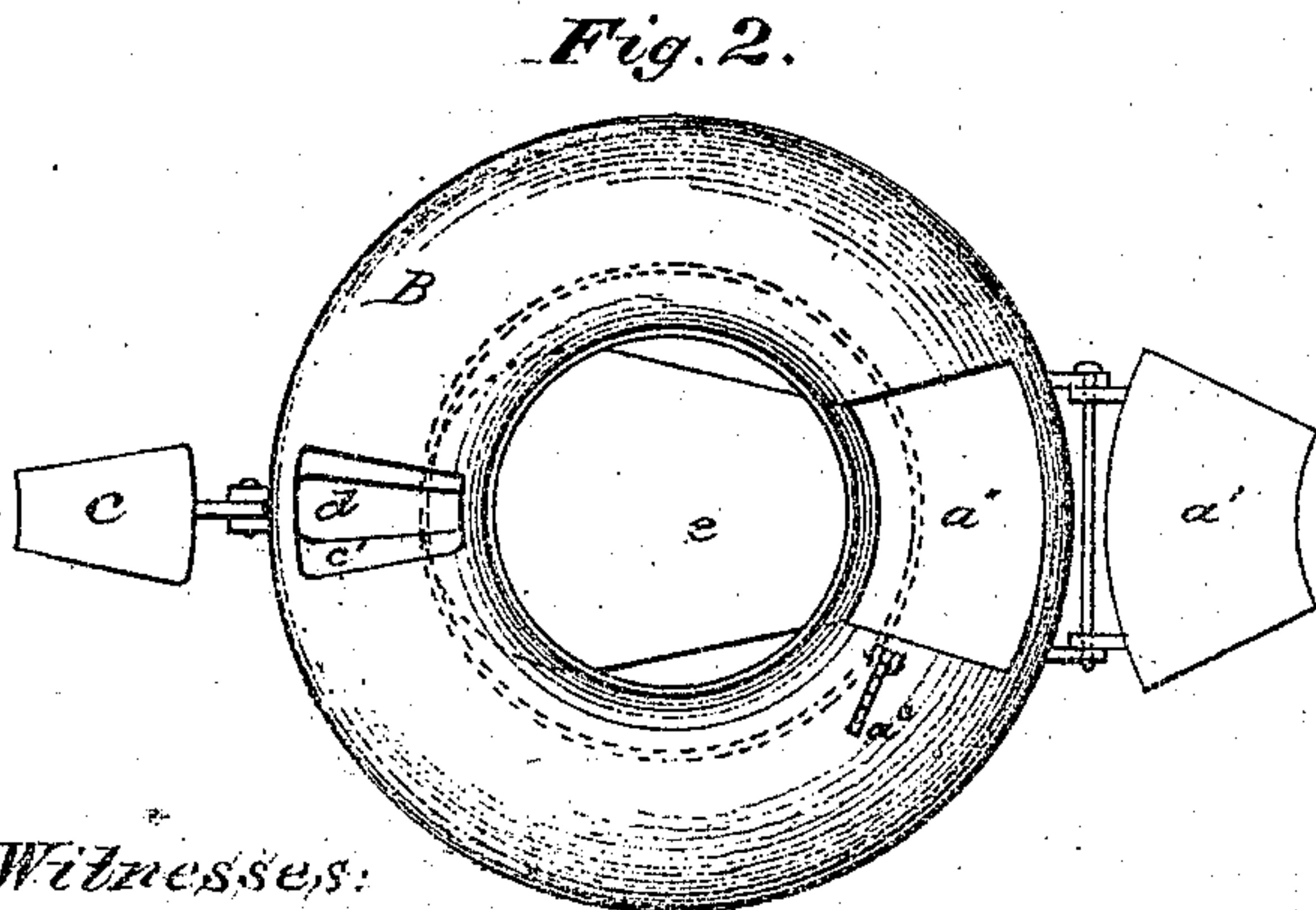
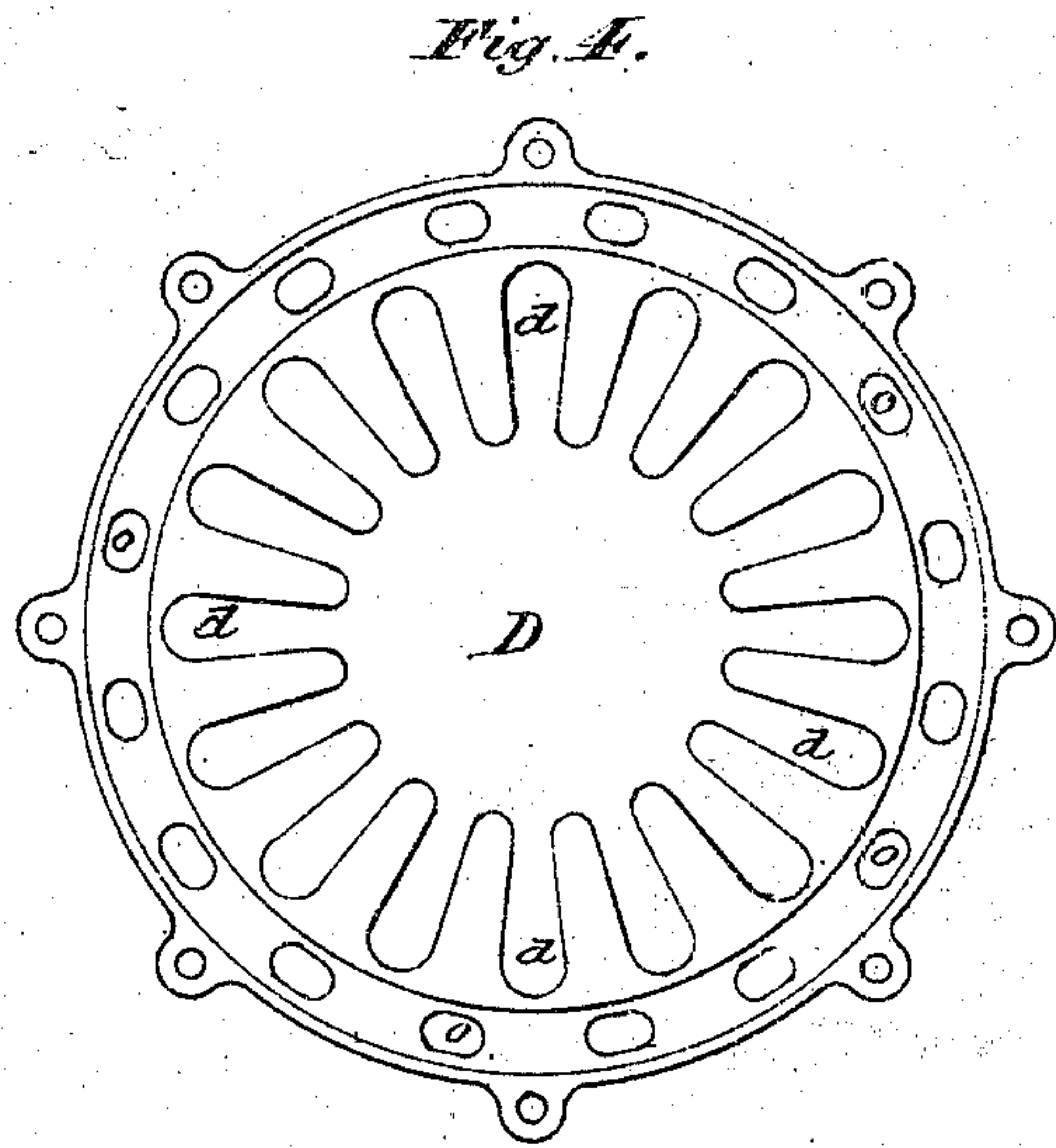
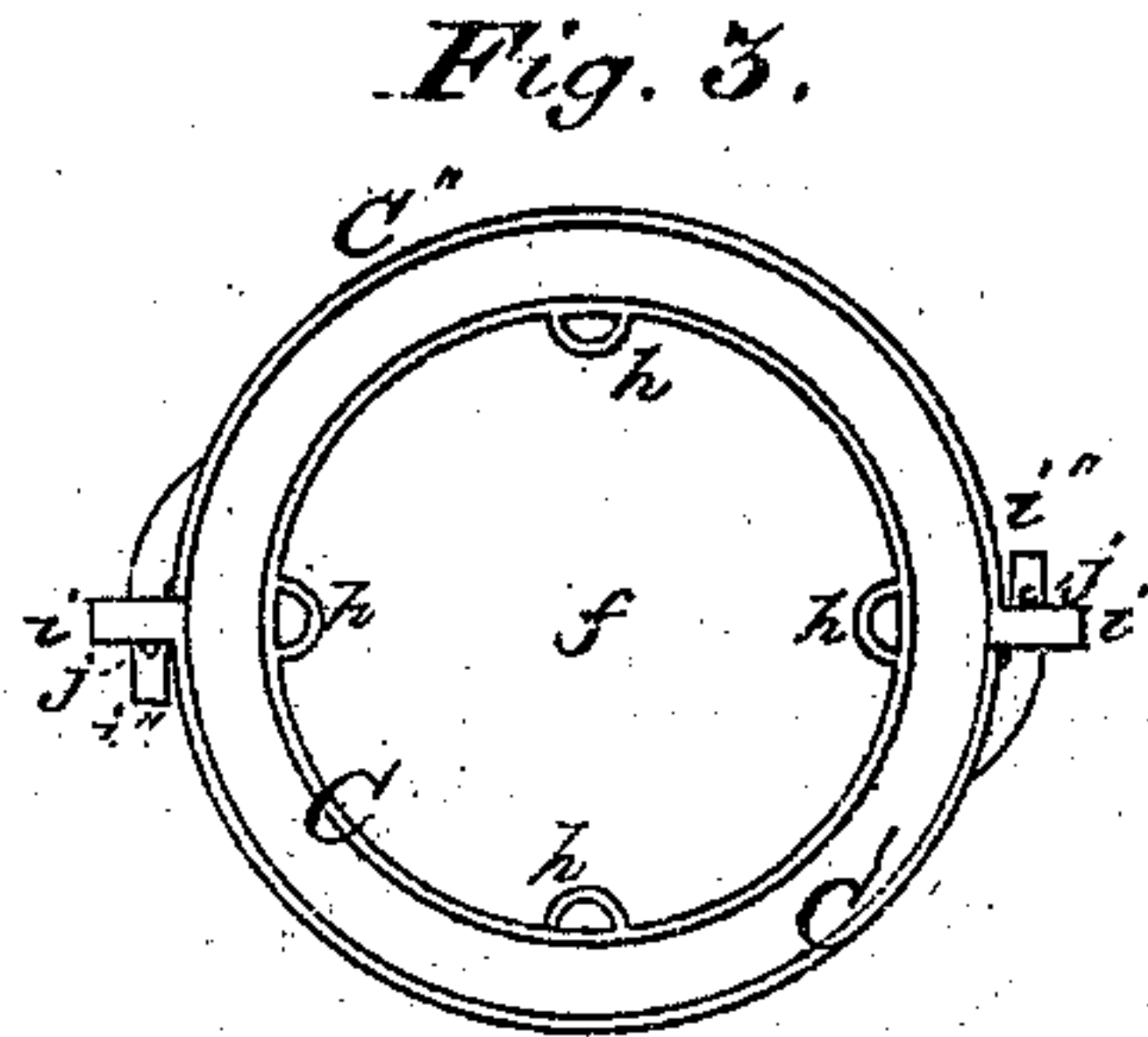
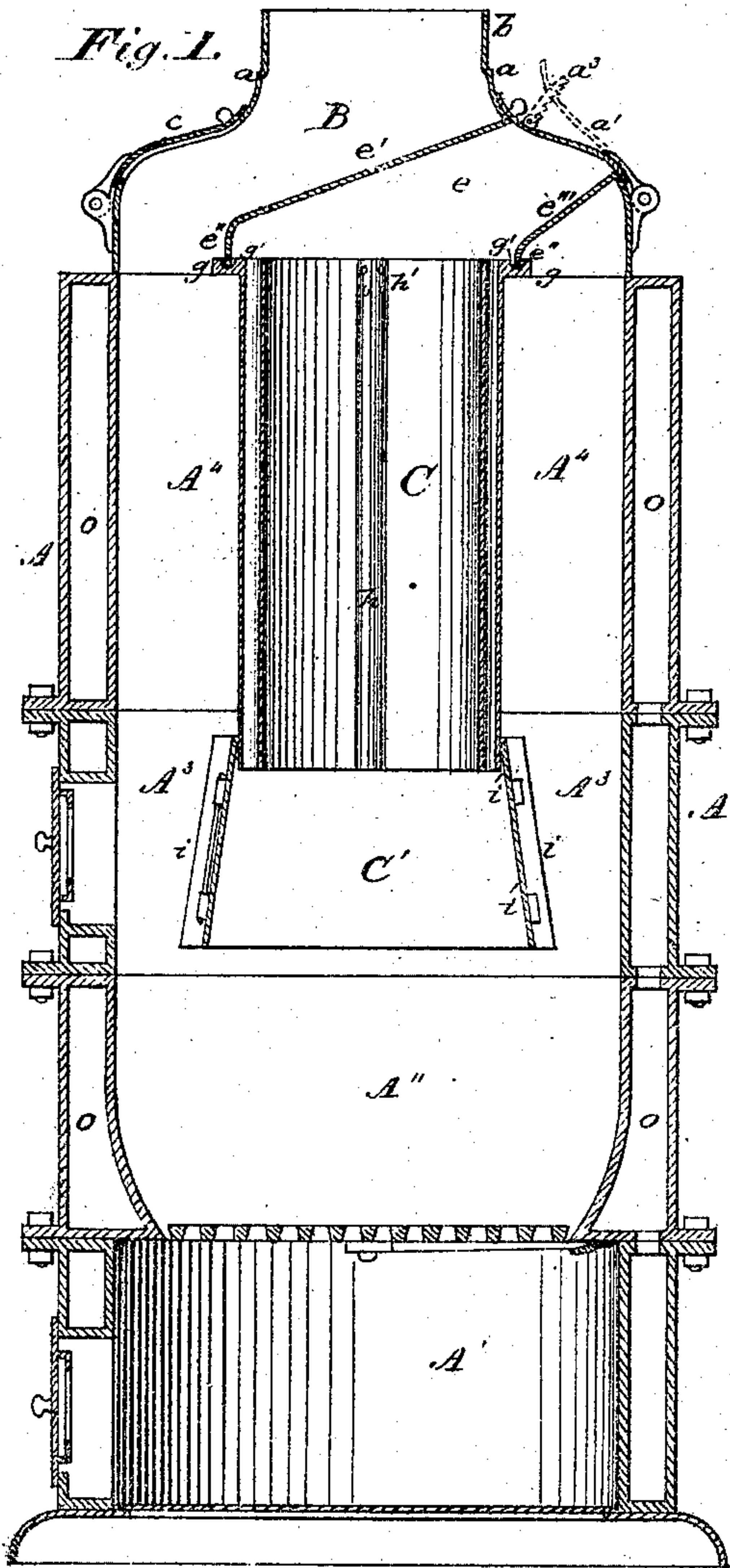


118197

**ORLANDO CLARKE.**  
*Steam Generator.*

PATENTED AUG 22 1871



Witnesses:

*J. C. Brecht.*  
*Charles Chinn*

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*Orlando Clarke*  
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# UNITED STATES PATENT OFFICE.

ORLANDO CLARKE, OF ROCKFORD, ILLINOIS.

## IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. 118,197, dated August 22, 1871.

*To all whom it may concern:*

Be it known that I, ORLANDO CLARKE, of Rockford, in the county of Winnebago, in the State of Illinois, have made certain Improvements in Steam-Generators and Water-Heaters, of which the following is a specification:

The invention is an improvement upon an invention described in a patent granted to applicant March 22, 1870, and numbered 100,983; and it consists in the construction of the lower or delivery end of the fuel-magazine that feeds the coal to and supplies the fire-box with coal as fast as it is burned away; also in the construction and arrangement of the parts, whereby air is conducted and supplied to the burning coal; and in the manner of regulating that supply, and in the construction of the cap or dome of the generator, for the purposes hereafter described.

It is a well-understood fact that in the consumption of such coals as are highly impregnated with sulphur or bitumen such coals swell and occupy more space when heated to or about the point of ignition, and if there is not space enough for such expansion of the coal in the magazine at such point the coal is impacted and becomes clogged or choked, and will not fall down into the fire-pot or furnace to keep up the combustion, and artificial means has to be used to discharge the coal from the magazine when so clogged in the base thereof.

This process is difficult and always results in a loss of heat, and in this respect my improved construction entirely obviates the difficulty, and the coals will always be sure to supply the fire-box by their own specific gravity as fast as the coal underneath is burned away.

Bituminous coal, as generally burned, emits a vast amount of smoke and unconsumed gases that by this improvement are so nearly consumed as not to be offensive, and in such consumption evolves considerable heat, that in ordinary furnaces passes off with the other products of combustion without utility.

In the drawing, Figure 1 is an upright sectional view of the steam-generator. Fig. 2 is a top view of the top of the cap or dome. Fig. 3 is an end view of the removable magazine and air-pipes or flues; and Fig. 4 is an end view of one of the upper sections.

A represents a steam-generator, composed of sections A', A'', A<sup>3</sup>, and A<sup>4</sup>, which are all sub-

stantially represented in the patent cited, but section A<sup>4</sup> may be subdivided into two or more sections or parts when desired. These different sections are secured together by any known secure method, so as to be steam and air-tight, and have the fire-flues *d* and steam or water-spaces *o* the same as in the patent cited. B is the cap or dome, made of sheet or cast metal, in the form substantially as seen in Fig. 1, with its lower edge forming a joint upon the top of the upper section, and has an upright projecting tube, *b*, inserted in the circular opening on the top of the cap, and fast therein, to receive over it the smoke-flue, which carries off the products of combustion, and at the junction of the tube with the cap there is a shoulder, *a*, to sustain the flue-pipe, so that it will not bind on the cap and become fast thereto. This cap has at the proper place on it a door, *a'*, that is hinged to it and covers the opening *a''*, for receiving the fuel and admission of air. In order to hold the door at any desired position to admit more or less air through opening *a''*, there is hinged to the cap a notched stud, *a<sup>3</sup>*, by which the door is held at any position desired. On this cap B is also hinged a flue-hole door, *c*, covering the opening *c'*, to be opened only when it is necessary to clean out the fire-flues *d* below it in section A<sup>4</sup>, or top section or sections of the generator. Door *a'* opens into a fuel-chute, *e*, that is covered on its top *e'*, and has an inclined bottom, *e'''*, to the opening *f*, and constructed so as to form on its lower horizontal edge a ring, *e''*. C is an upright cylindrical and removable fuel-magazine, that extends through and below the bottom of section A<sup>4</sup> or top sections and into section A<sup>3</sup>, and is of such diameter as will freely slide in and yet fill the circle of the opening D in the center of section A<sup>3</sup> and A<sup>4</sup>, and forms the inner sides of the fire-flues *d*, and in contact with the inner curvature of the wall that separates the water-spaces from the smoke-passages, thereby preventing the coal in the magazine from becoming heated to a greater degree than the water in the water-spaces, which is below the temperature at which the coal will expand. At the upper end of the fuel-magazine and made fast thereto is a flange, *g*, that is larger in diameter than the body of the magazine, and which rests upon the top face of the upper section of the generator, and thereby the magazine is sustained in its position. In the top of this



flange is an annular groove,  $g'$ , a little wider than the metal that forms the ring  $e''$  is thick, and in which the said ring  $e''$  rests, and can be made air-tight or nearly so by introducing fine sand therein, and yet allow the cap to freely turn by being guided in its revolution by this concentric annular groove  $g'$  and ring  $e''$ , while its base rests upon the top face of the upper section of the generator. This construction of parts allows of the horizontal revolution of the cap B upon the upper section of the generator, in order to bring the opening  $c'$ , covered by door  $c$ , to be over any of the fire-flues  $d$ , for the purpose of cleaning them of dust and soot, and prevent them from becoming foul, and also to separate the fuel-magazine opening from the smoke-space that occupies the cap, and allow the door  $a'$  to be brought to any relative position with the generator desired. To the inner diameter of the fuel-magazine C, and extending its entire length, is any number of air-tubes or flues,  $h$ , which are closed on their top ends to prevent small pieces of coal or other substance from filling them, and have any number of small holes,  $h'$ , through their sides, near to the top ends, to freely admit the air, while their lower ends are left open. At the bottom of the upright cylindrical magazine C is a bottom section,  $C'$ , which is made to surround the lower end of C and be firmly attached thereto, and yet so as to be removed therefrom, when desired, and is of conical form, or larger in diameter at its lower end than at its top or upper, where it is attached to C, and is constructed in this form so that when the bituminous coal that is used for fuel, and which swells in bulk as it becomes heated, shall not clog or fail to supply the combustion-chamber with fuel as fast as it burns away and is needed. This conical section  $C'$  is made in halves, each half having a flange,  $i$ , at one side, having mortises  $i'$  through them, and tenons  $i''$  on the other side that will fit into the mortises in the flanges, and so that when the halves are put together they will form in cross-section a perfect circle, and when so put together the halves are secured together and to each other by keys or pins,  $j$  passing through the ends of the tenons, as seen in Fig. 3.

Section  $C'$  may be in two or more parts in its height, when desired, for the convenience of putting together and attaching it to the magazine C through an aperture in the side of section  $A^3$  of the generator, and is made of cast or wrought metal, as fancy may dictate.

In the construction of the fuel-magazine and its air-pipes or flues there may be substituted for the tube  $h$  a sufficient number of inwardly-projecting ribs, and within them have inserted an inner cylinder, and attached at its upper end to

the flange  $g'$ , with openings through the flange between the ribs for the passage of air, which will form air-flues to conduct the air to the burning coal at the lower end of magazine C, and prevent fuel in the magazine from becoming heated too much before falling into section  $C'$ . By this method of admitting the air from the top down through the magazine and in close contact with the fire-flues  $d$ , the air becomes heated, and, as the combustion of the coal is taking place at the lower end of section  $C'$  of the magazine, the air that is admitted through the opening  $a''$  of the cap B, and thence down through tubes or flues  $h$  to the point of combustion, is in just the condition to mix freely with the gases there evolved and make the combustion of both smoke and gases complete, and thus essentially contribute to the saving of fuel by being the agent to cause a better combustion of all the gases in the fuel.

The amount of air to be thus supplied is regulated by means of adjusting the hinged door  $a'$  upon the notched stud  $a^3$ , as the door can be supported and held on any of the notches on the stud, and thus admit a greater or lesser amount, as may be desired, for the complete combustion of the fuel.

Instead of a hinged door,  $a'$ , a sliding plate may be used, which will control the supply of air the same as the door.

Having thus described my improvement, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The upright cylindrical fuel-magazine C, having air-tubes or flues  $h$ , in combination with the conical or flaring section  $C'$ , in the manner and for the purpose shown and described.
2. The conical or flaring section  $C'$ , made in halves or two upright parts and joined together in the manner and for the purpose described.
3. The revolving cap B, having opening  $a''$ , hinged door  $a'$ , or sliding plate and fuel-chute  $e$ , in combination with the magazine C and section  $C'$ , in the manner and for the purpose described.
4. The revolving cap B, having opening  $c'$  and hinged door  $c$ , in combination with the fire-flues  $d$  in top or section  $A^4$  of the steam-generator, in the manner and for the purpose described.
5. The steam-generator herein described, composed of the several sections  $A'$ ,  $A''$ ,  $A^3$  and  $A^4$  with their fire-flues  $d$  and water and steam-spaces  $o$ , in combination with the revolving cap B, with fuel-chute  $e$ , magazine C, and section  $C'$ , in the manner described.

ORLANDO CLARKE.

Witnesses:

JAS. M. SEYMOUR,  
CHARLES CHINN.