

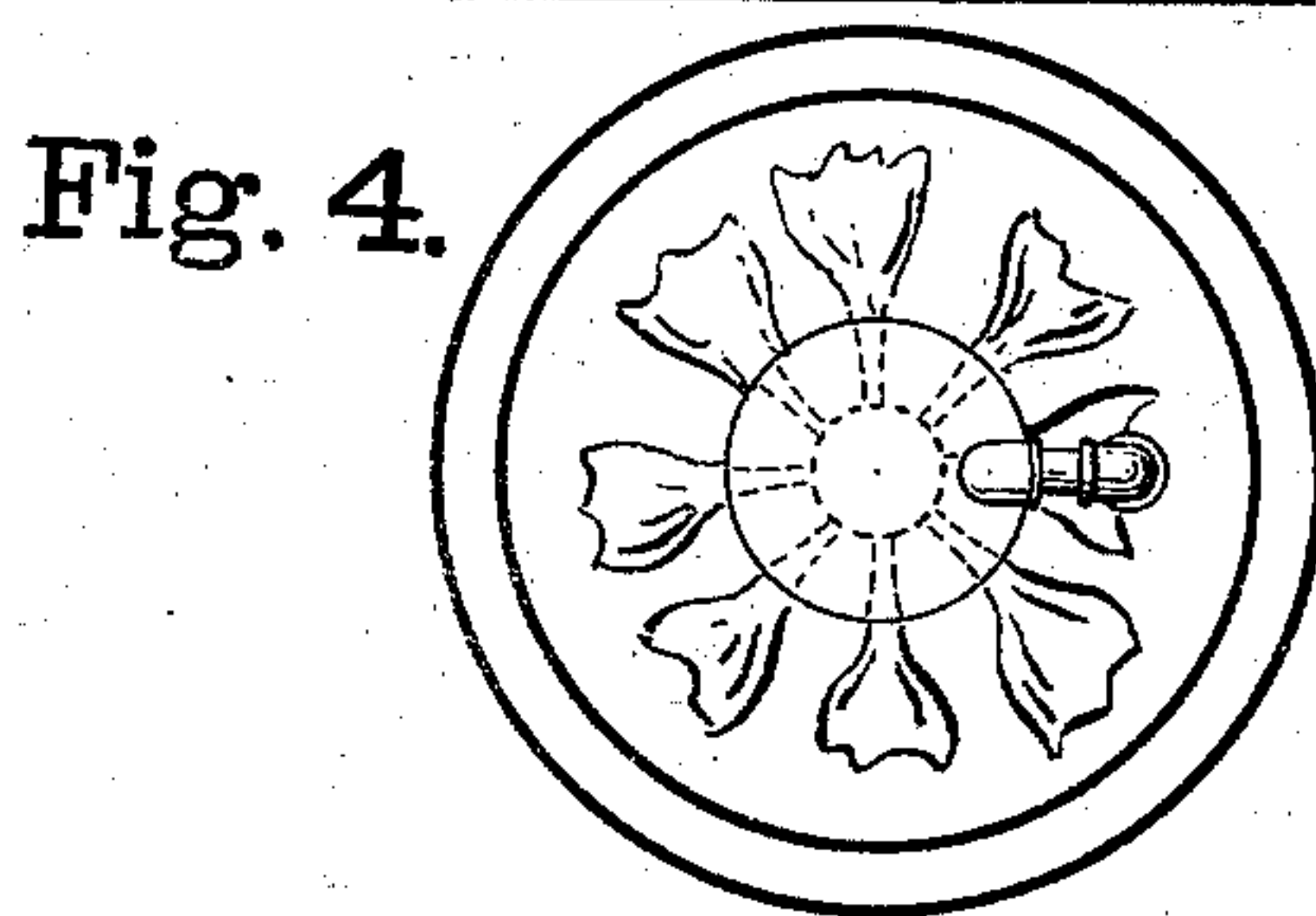
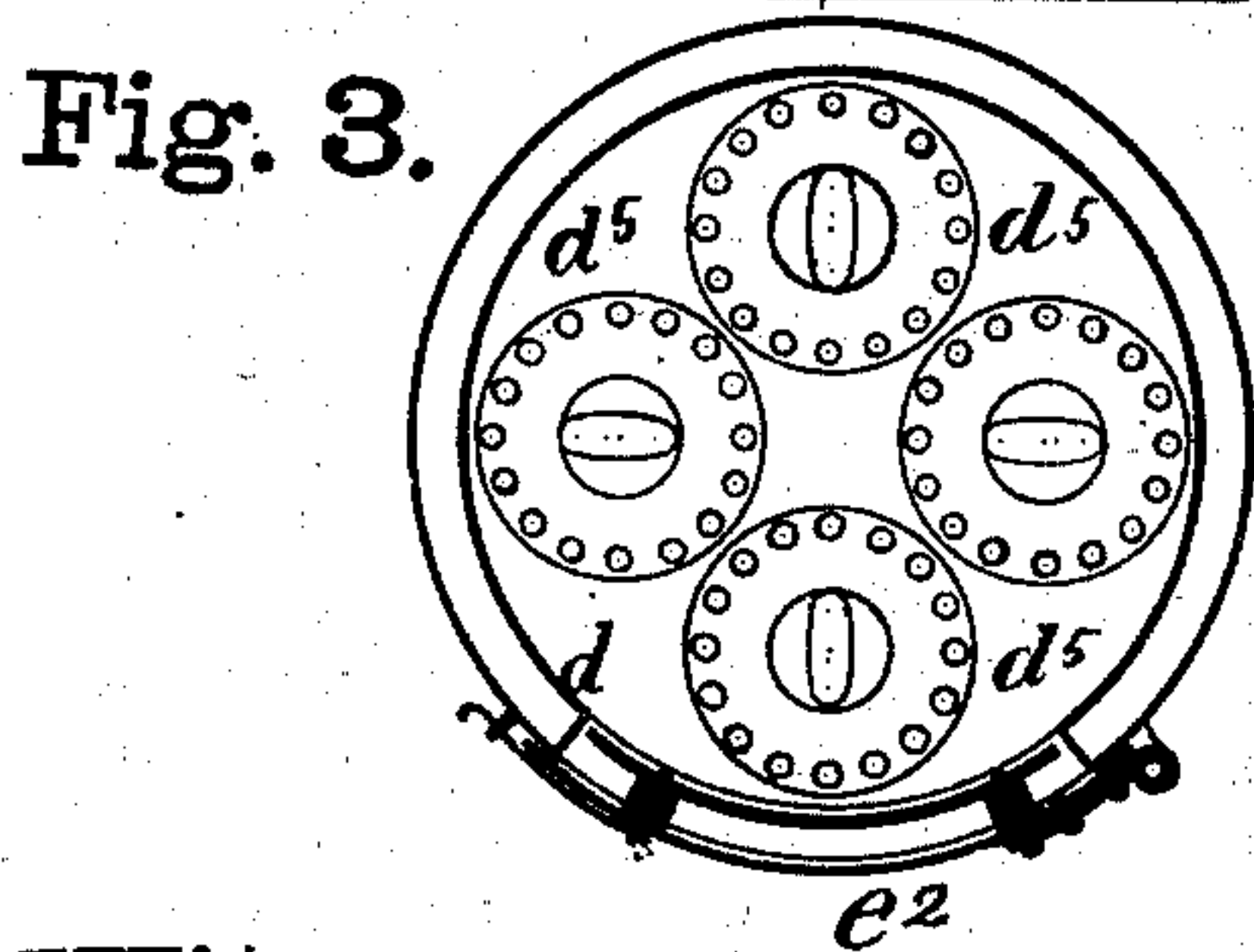
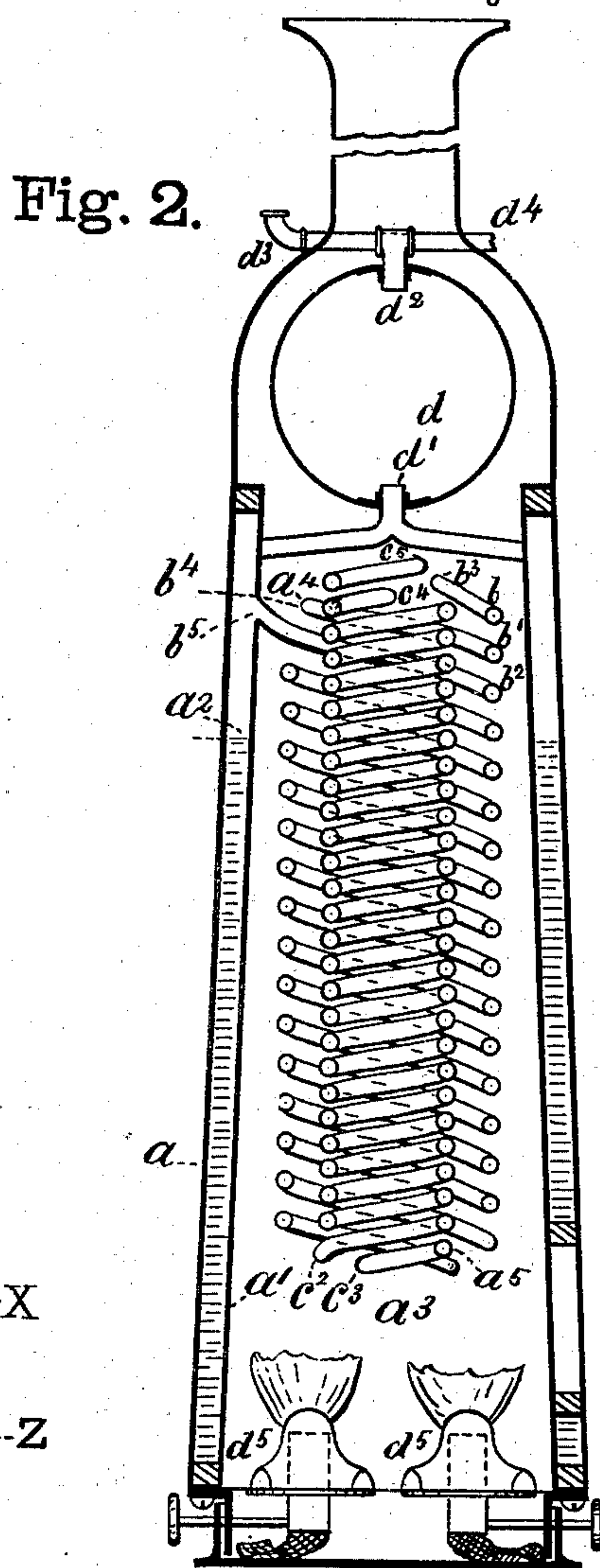
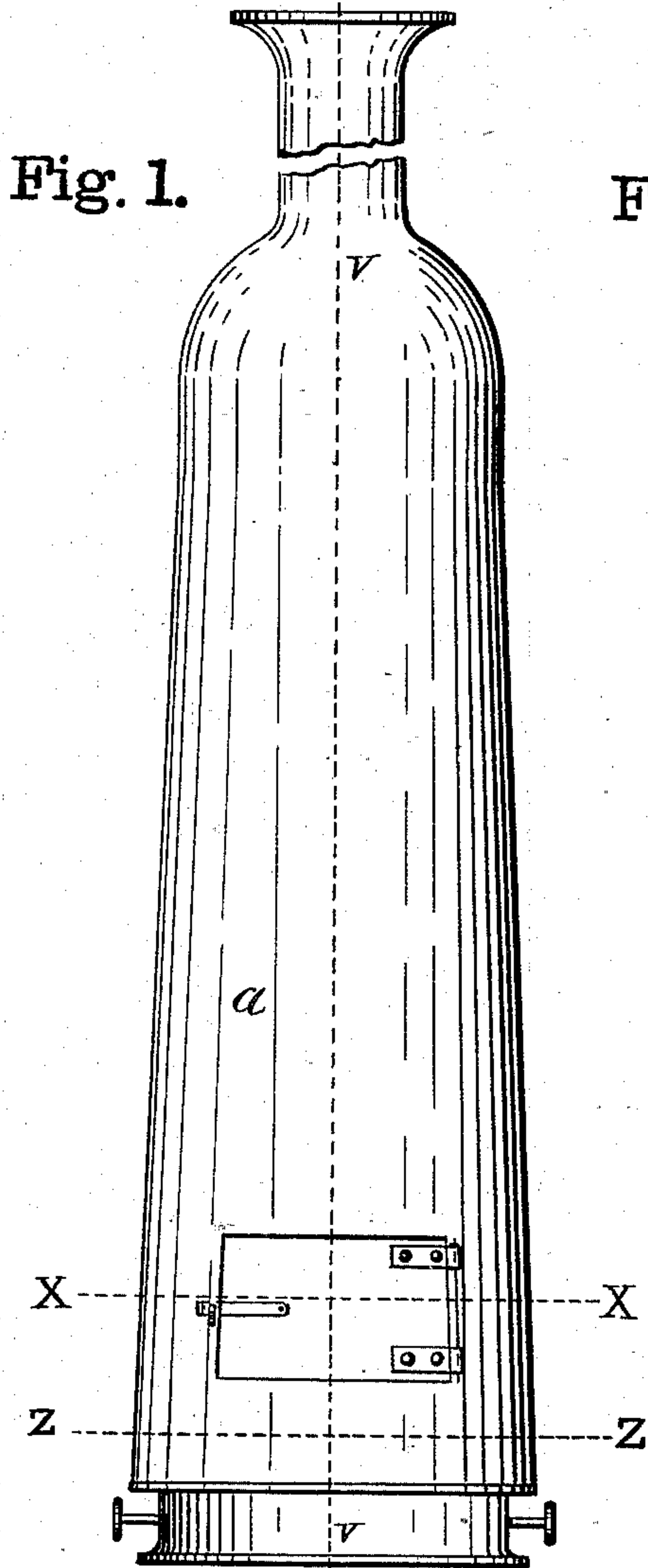
(No Model.)

R. VENATOR & J. WELLER.

STEAM GENERATOR.

No. 282,243.

Patented July 31, 1883.



Witnesses.

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# UNITED STATES PATENT OFFICE.

ROBERT VENATOR AND JOHN WELLER, OF BUFFALO, NEW YORK.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 282,243, dated July 31, 1883.

Application filed January 13, 1883. (No model.)

*To all whom it may concern:*

Be it known that we, ROBERT VENATOR and JOHN WELLER, citizens of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

The object of our invention is to produce a light, strong, and quick-acting steam-generator adapted for light engines, all of which will be fully and clearly hereinafter described by reference to the accompanying drawings, in which—

Figure 1 is a side elevation; Fig. 2, a vertical central section through the boiler. Fig. 3 is a horizontal section through line  $xx$ , Fig. 1; and Fig. 4 is a horizontal section through line  $zz$ , Fig. 1, showing a plan view of a suitable means for burning gas or vapor.

The outer and inner shells,  $a$   $a'$ , are formed so as to leave an annular water and steam space,  $a^2$ , between them. On the inner side,  $a^3$ , of the boiler are two sets of tubular coils,  $a^4$   $a^5$ . The first set of coils,  $a^4$ , consists of the coils  $b$   $b'$   $b^2$ , the coil  $b$  being connected to the inside at or near the point marked  $b^3$ , so as to lead into the water and steam space  $a^2$ . The coil  $b'$  is connected to the inside of the boiler at or near the point  $b^4$ , and the coil  $b^2$  is connected to the inside at or near the point  $b^5$ . These coils are also connected to the inside or to the water and steam space at their lower ends, as shown, the connections being made in any well-known way. In the drawings we have shown three of these coils in one set; but there may be two or more of such coils in a set. The set of coils  $a^5$  consists of the coils  $c$   $c'$ . They are arranged inside of the set of coils  $a^4$ , and are each connected to the inner shell,  $a'$ , at the points  $c^2$   $c^3$   $c^4$   $c^5$ , or at any other suitable points within the water-space  $a^2$ . Two of such coils are shown, but more may be used, if desired. The object in using two or more coils in each set is to give a longer lead or quicker pitch to the coils, so that the circulation within them will be more rapid while the boiler is in operation, and at the same time give a very large amount of heating-surface.

$d$  is a spherical shell, made sufficiently strong to resist any required pressure. It is made of

copper or iron in the usual way, and is connected to the inner shell,  $a'$ , by the tubes  $d'$   $d^2$ , and is provided with a tube,  $d^3$   $d^4$ , the portion  $d^3$  for admitting steam to the safety-valve and the part  $d^4$  for conducting steam to the engines. The object of the shell  $d$  is to afford room for dry steam, which becomes superheated by the hot current of air as it passes up from the combustion-chamber, its position being such that it receives a large amount of heat, which goes almost completely around it as it passes in the direction of the arrows through the flue to the smoke-stack or chimney. It is adapted to be operated by either oil, gas, or other combustible vapor.

The device for burning oil consists of any suitable well-known burners,  $d^5$ , arranged at the lower part of the combustion-chamber  $c$ . They should be provided with wicks and the usual means,  $e'$ , for raising or lowering them.

In Fig. 4 we have shown a suitable burner for using gas; but as this is made in the usual or any well-known way, a further description here is not necessary. The boilers are provided with an ordinary door,  $e^2$ , hung on hinges in the usual way. In boilers of large size made in this way coal or wood can be used as fuel.

The operation is simple, and will be clearly understood by reference to the drawings. In some cases, when sufficient room is left for steam-space, the spherical shell may be dispensed with; but we prefer the combination described.

We claim—

A steam-generator consisting of the inner and outer shells,  $a$   $a'$ , having the annular water and steam space  $a^2$ , in combination with the sets of coils  $a^4$   $a^5$ , each set consisting of two or more coils connected to the steam and water space, substantially as specified, a spherical shell connected to the inner shell,  $a'$ , and a suitable combustion-chamber and heating device, substantially as described.

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Witnesses:

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JAMES SANGSTER.