

No. 765,012.

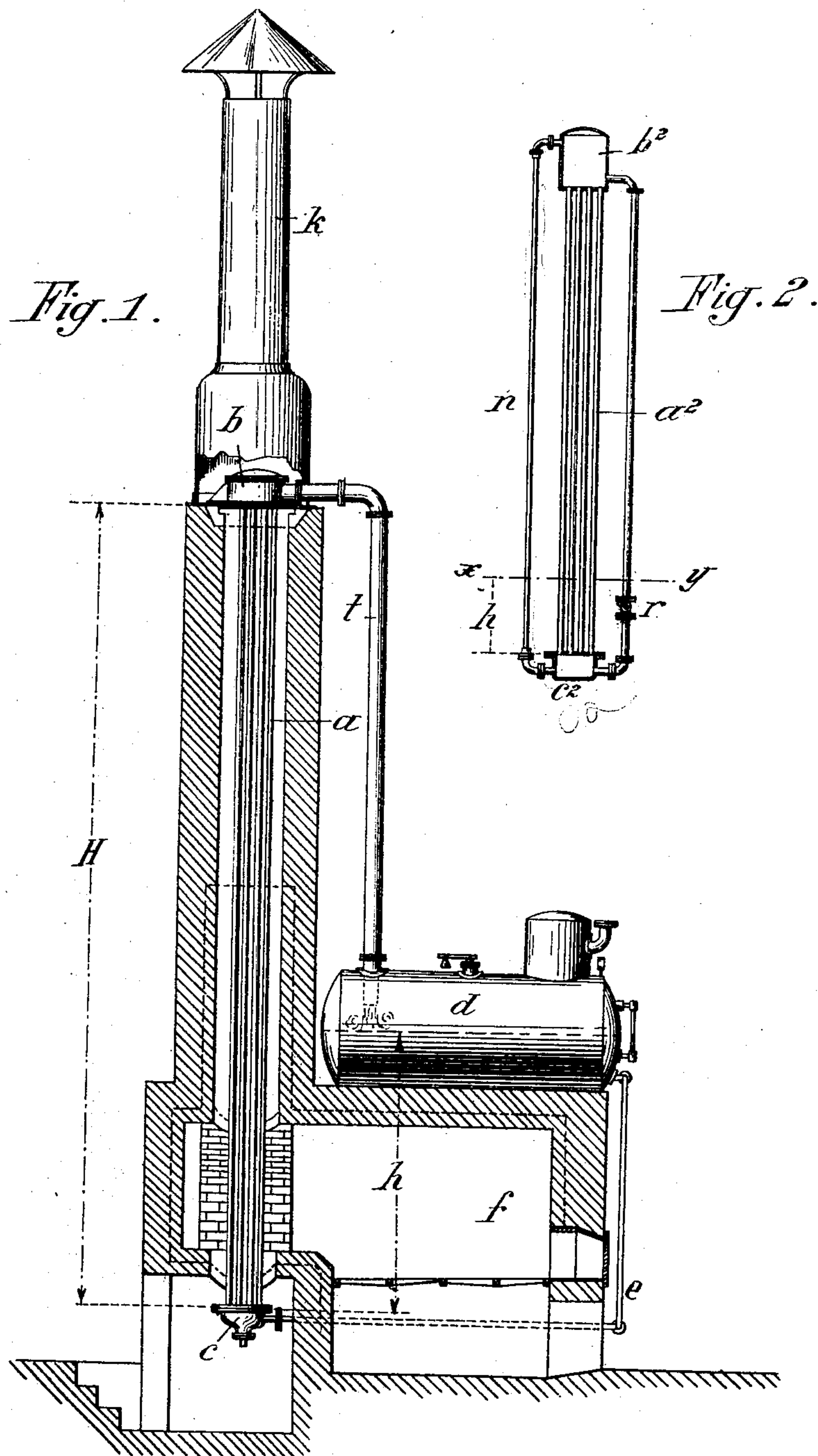
PATENTED JULY 12, 1904.

P. KESTNER.
STEAM GENERATOR.

APPLICATION FILED MAY 8, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:

O. Carlberg.
L. Waldman

Inventor:

Paul Kestner
per P. Singer.
Attorney

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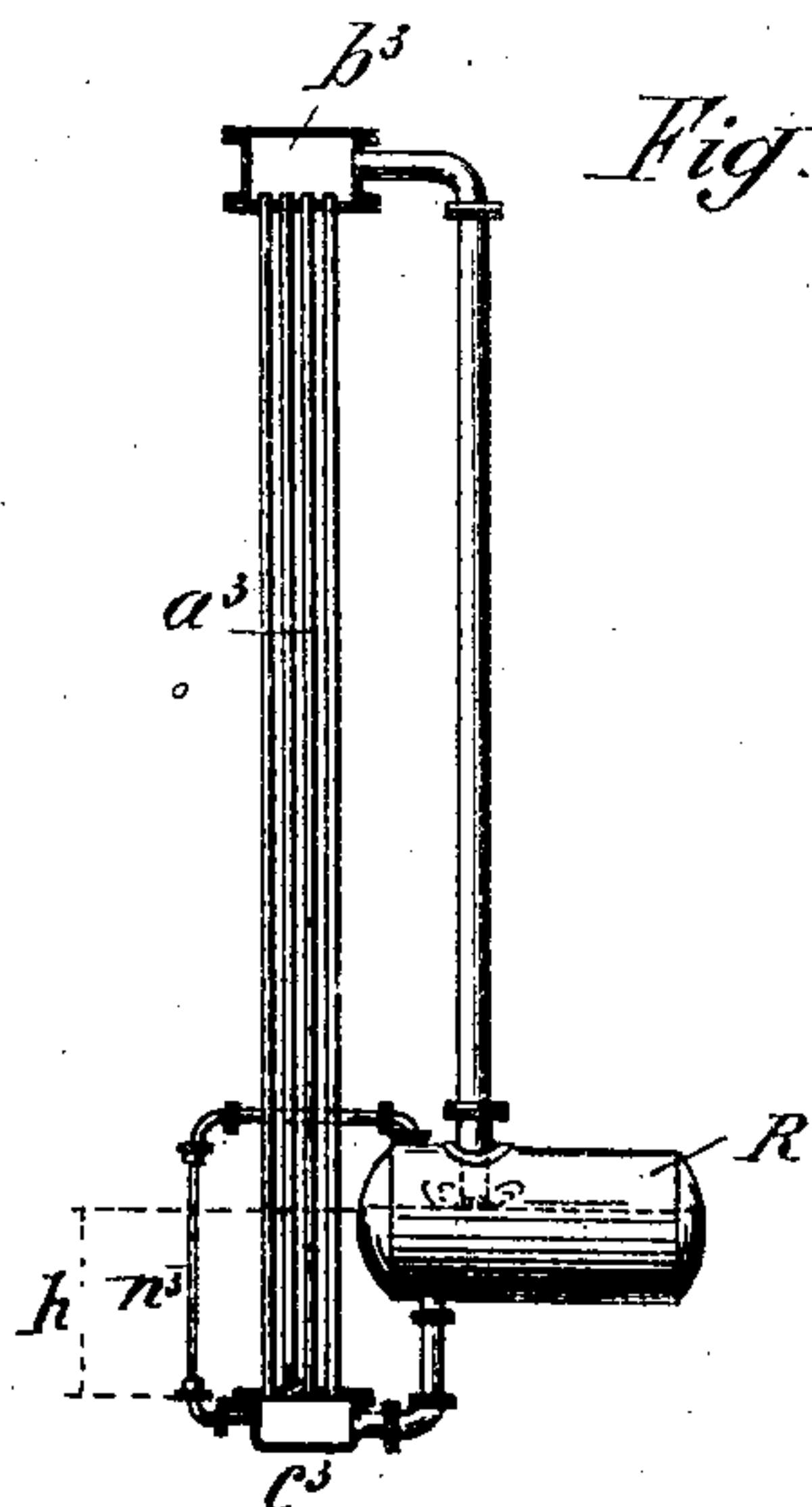


Fig. 3.

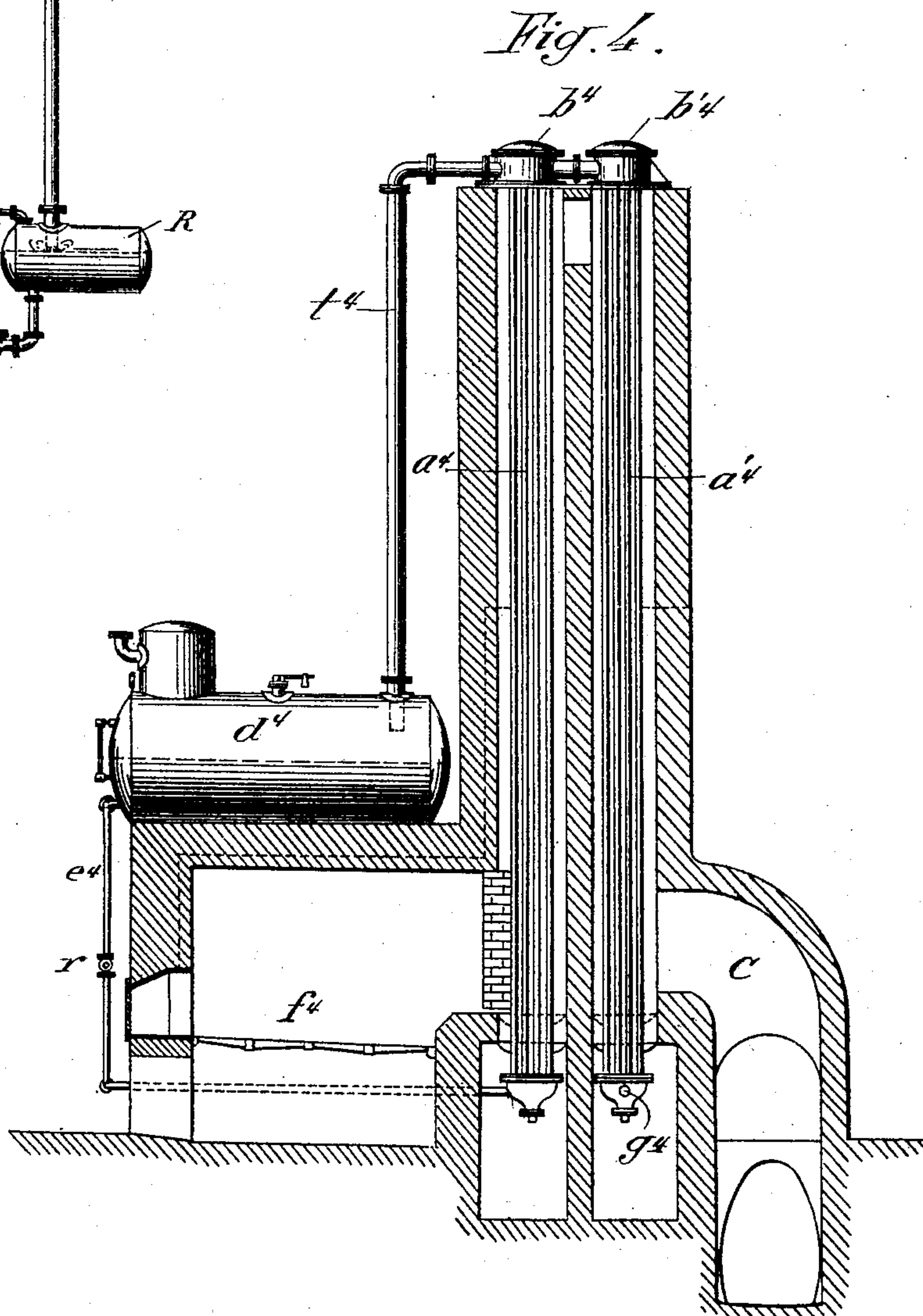


Fig. 4.

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UNITED STATES PATENT OFFICE.

PAUL KESTNER, OF LILLE, FRANCE.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 765,012, dated July 12, 1904.

Application filed May 8, 1903. Serial No. 156,187. (No model.)

To all whom it may concern:

Be it known that I, PAUL KESTNER, a citizen of the French Republic, and a resident of Lille, France, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

The object of the present application is a vertical-tube and circulating steam-generator, the principal characteristic whereof is to allow, while using very long vertical tubes, the steam and water reservoir to be placed very low—at a height at which it may be easily inspected.

The generator in its simplest form is shown in Figure 1. It comprises, essentially, a vertical bank or group *a* of tubes, the tubes whereof are of a considerable length and placed in a flue receiving the gases from a furnace *f*. At their lowermost part the tubes communicate with a box *c*, which is connected by a tube *e* with a receiver *d*, placed over the furnace or even lower, as it will be hereinafter explained, this receiver containing the water to be vaporized as well as serving as a reservoir for steam. It is furnished with a water-gage glass and the usual accessories. The box *c* can also be replaced by any suitable collector, as in ordinary tubular boilers, and upon which are branched several sets of tubular bunches. At their upper part the tubes of the tubular bunches communicate with a box *b*, connected by a pipe *t* to the upper part of receiver *d*, into which it dips without reaching the level of the water.

To simplify the drawing, the vertical flue containing the tubular bank has been provided at its uppermost part with a smoke-box surmounted with a chimney *h*, by means whereof the draft of the furnace is effected. Anyhow in practice a second and descending flue will be arranged containing a second and identical bank and by means whereof the gases will redescend to pass through the opening of the chimney, Fig. 4.

The drawing of Fig. 1 shows at the point where the gases from the furnace come in contact with the tubular bank an arrangement of staggered circular bricks, so as to better separate the gases and assure the complete consumption of smoke.

The principle upon which the generator in question is based is as follows: I have noticed that if in a vertical-tube boiler having a return-tube for water—such as, for instance, the Cahal boiler, Fig. 2—a cock *r* is placed upon the return-tube to throttle the admission into the bunch and a water-level *n*, connecting the lower chamber with the upper part, the section may be reduced to one per cent. of the total section of the tubes without the circulation being stopped or the force of the boiler being decreased. On the contrary, it increases. At the same time it will be noticed that the level of the water in the gage-tube *n* decreases to a point which descends according to the throttling. It can descend to one-tenth of the height of the tubes—for instance, seventy centimeters, if the tubes are seven meters in height—without the circulation ceasing. On Fig. 2 this level is shown at *xy*. The height *h*, Fig. 2, from the level of the water in the tube *n* to the base of the evaporating-tubes indicates the resistance in the tubes and at the same time the lowest head that must be given to the feed in order to overcome this resistance.

I have deduced from the above that the throttling, by means of the tap *r*, Fig. 2, to secure a decrease of the effective head of the feed can be replaced by simply placing the top receiver at a lower level—that is to say, that this top reservoir, so inconvenient in vertical boilers, may be moved and placed at the bottom at R, Fig. 3. In this figure we will find the general arrangement described in Fig. 1—viz., the tubular bank *a*³, the lower box *c*³, communicating with the reservoir R, and the upper box *b*³, which communicates with R. The tube *n*³ indicates the pressure of the feed *h*.

The experience has perfectly confirmed the above combination, and the hereinbefore-described boiler, which forms the object of my application for patent, is the development thereof. In this boiler I have placed the reservoir for steam and water over the furnace because it was the place which appears to me to be most convenient; but it can be fitted at any spot and lower. I have already said that *h* can be equal to a one-tenth of H, Fig.

1. It can also be placed higher at any intermediate level between the top and the bottom of the tubes. In this boiler thus constituted and which can, moreover, be completed by a
5 cock γ , placed upon the pipe above the level X Y, in order to still regulate the ingress into the tubes, an absolutely regular production of steam is obtained, which proves that the
10 tubes are well wetted over their whole height and that the circulation is very regular—that is, that the tubes may be heated by the most intense source of heat it is possible to obtain without being able to get them red-hot.

As I have already remarked, there would be
15 a practical advantage in placing the boiler as shown in Fig. 4. The gases from the furnace f^4 heat the tubes a^4 of the boiler proper, then pass, before entering the chimney by the flue C, into a second vertical flue containing a tu-
20 bular bank a'^4 identical with the former and which serves as a reheater. The water furnished at g^4 by a pump (not shown) rises in the bank a'^4 , taking a movement opposite to

that of the gases, becomes heated and arrives, by passing through the boxes b'^4 and b^4 , into
25 the reservoir d^4 , from whence it passes by the tube e^4 into the evaporating-bunch a^4 .

Having now fully described my invention, what I claim, and desire to secure by Letters
30 Patent, is—

In combination with a furnace provided with vertical flues, groups of pipes arranged in said flues, a boiler arranged above said furnace, and means for connecting the tops of said
35 group of flues with the top of said boiler, means for connecting the bottom of one group with the bottom of said boiler, and means connecting with the bottom of the other group for supplying water from a source of water-
40 supply, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

PAUL KESTNER.

Witnesses:

CHARRIER ZEIM,
C. PECKEL.