

No. 668,463.

Patented Feb. 19, 1901.

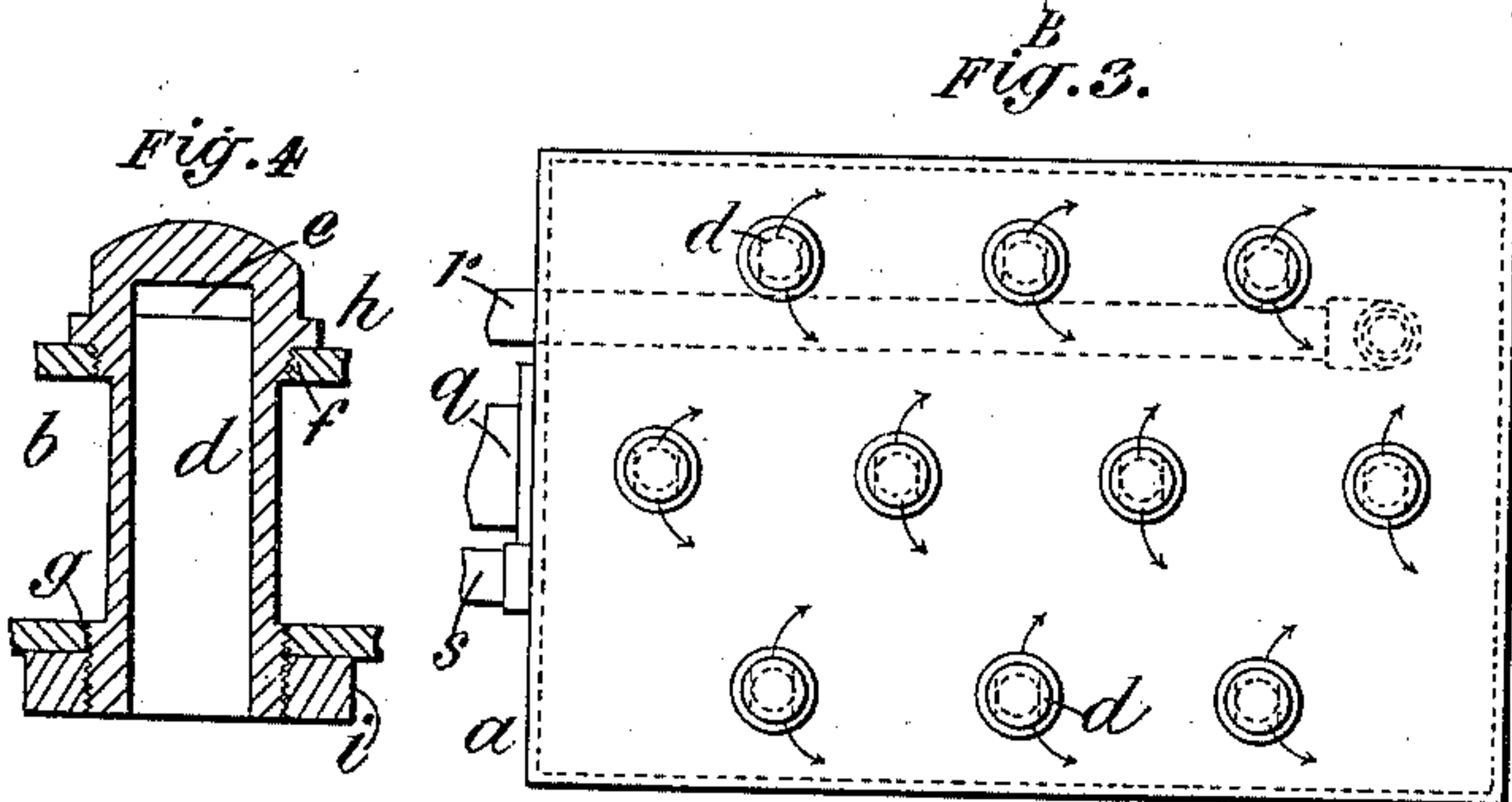
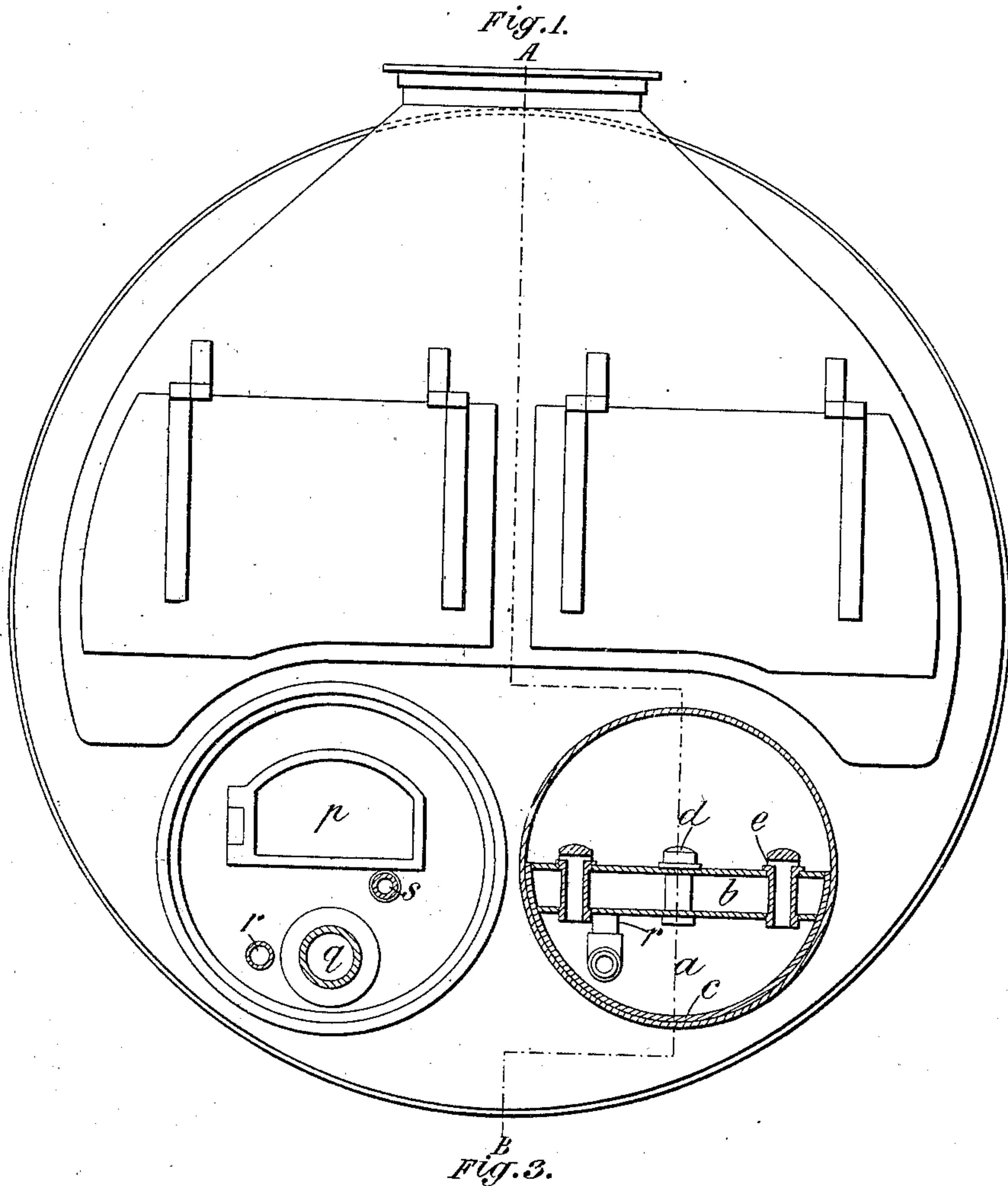
R. SCOTT.

STEAM GENERATOR AND FURNACE THEREFOR.

(No Model.)

(Application filed Feb. 19, 1900.)

2 Sheets—Sheet 1.



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2 Sheets—Sheet 2.

Fig. 2.

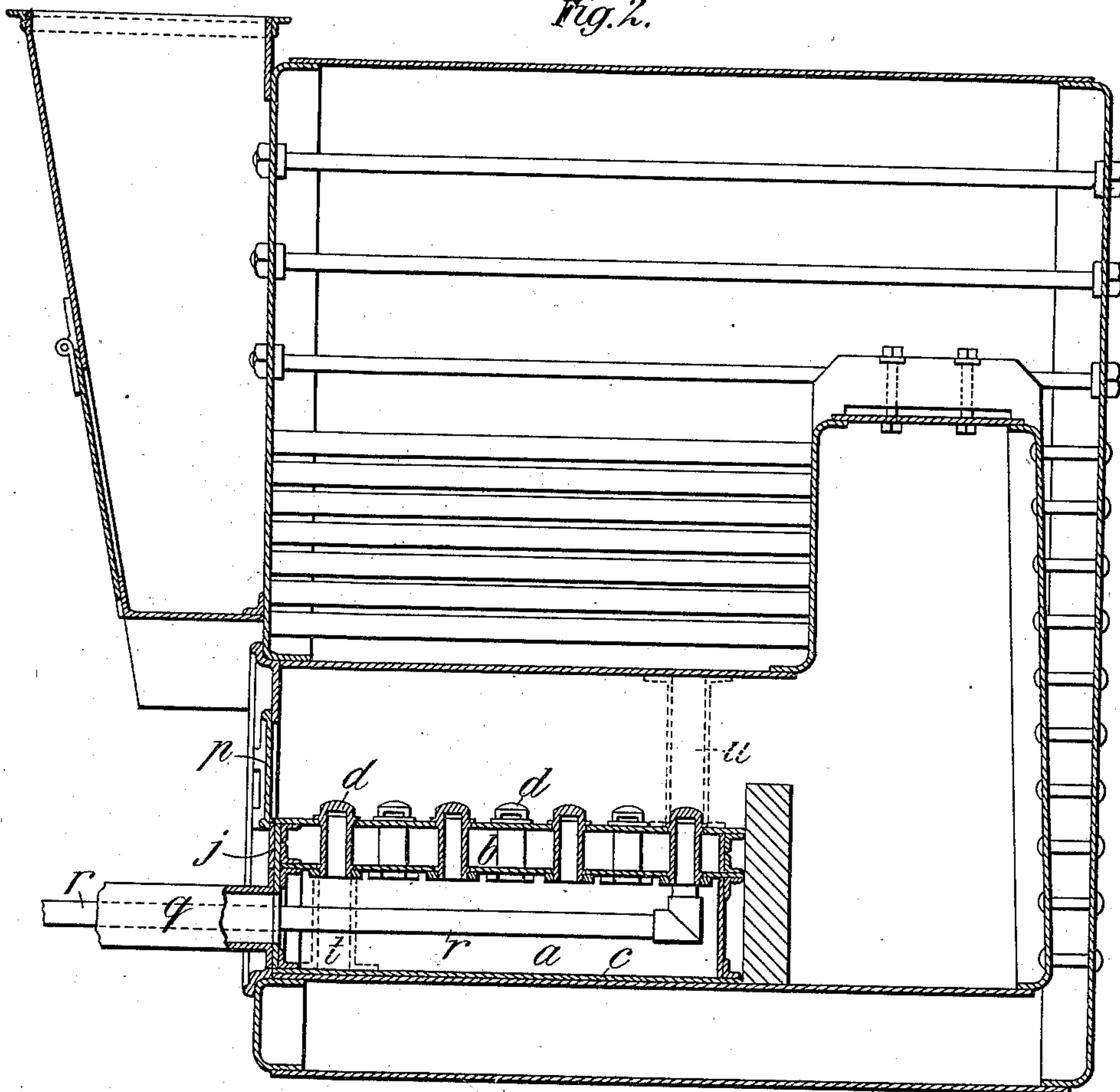
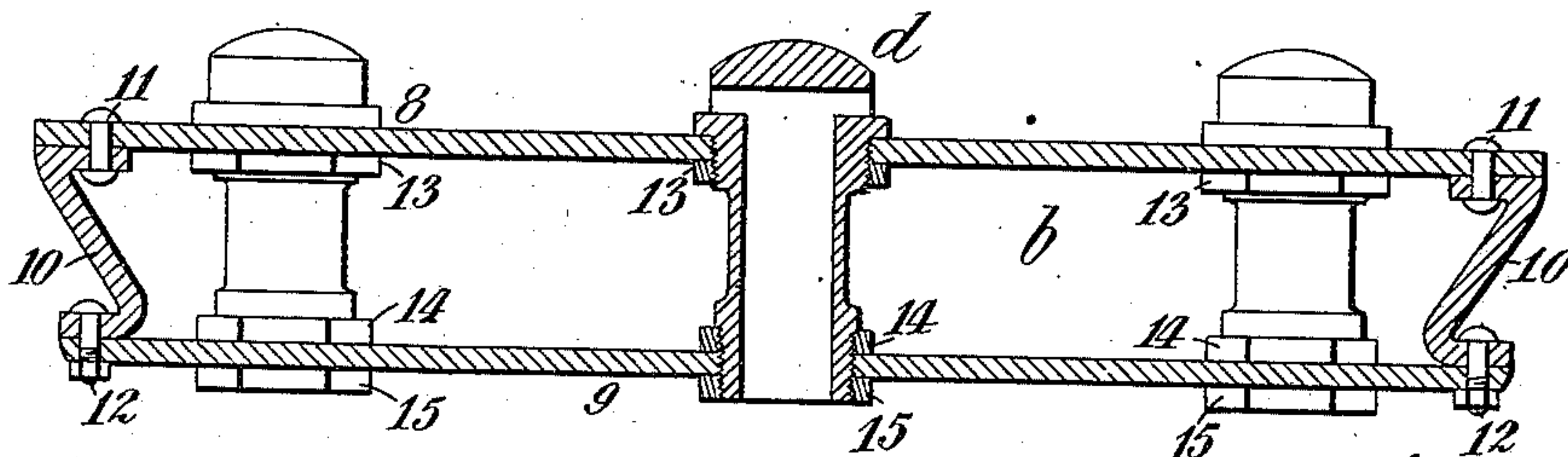


Fig. 5.



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# UNITED STATES PATENT OFFICE.

ROBERT SCOTT, OF LONDON, ENGLAND.

## STEAM-GENERATOR AND FURNACE THEREFOR.

SPECIFICATION forming part of Letters Patent No. 668,463, dated February 19, 1901.

Application filed February 19, 1900. Serial No. 5,802. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT SCOTT, a subject of Her Majesty the Queen of Great Britain, residing at London, in the county of Middlesex, England, have invented certain new and useful Improvements in and Connected with Steam-Generators and Furnaces Therefor, of which the following is a specification.

My invention relates to that class of steam-generators wherein the fuel is placed upon a plate (instead of, as is usual, upon fire-bars) and combustion supported by the introduction of a forced draft through suitably formed and placed twyers.

My principal object is to provide an arrangement for the above purpose and whereby the economies and improvements hereinafter indicated are effected. In particular I provide an arrangement that is capable of being inserted within and as easily removed from the furnace of a water-tube boiler, a refuse-destroyer furnace, or the flue of a Cornish, Lancashire, Scottish, marine, or other similar boiler in lieu or after the removal of the usual fire bars or grate.

By my invention I am enabled to use cheaper classes of fuel (for example, small coal or coal-dust) in the furnaces and to render the combustion much more complete, and the arrangement is such that the fuel is consumed in intimate contact with the water to be heated.

The characteristic features of my invention are that the fuel is placed upon a water-containing supporting-plate through which extend twyers with closed tops and lateral or deflected discharge-orifices that form the only communication between the combustion-chamber and a chamber beneath the water-containing fuel-supporting plate into which air is forced under pressure. The particular construction of twyers avoids the possibility of their becoming clogged or of the small particles of fuel falling through them into the air-chamber beneath, and at the same time the air issuing from them is directed laterally so as to compel it to percolate through the fuel layer, and thus assist combustion to the greatest degree.

According to my invention the fuel-supporting plate may be provided with a chamber passage or passages for the circulation of wa-

ter and the series of twyers which pass vertically up through the fuel-supporting plate and are closed at the top, but have lateral or deflected discharge-orifices through which air is fed to the fuel. These twyers may be made of separate pieces of metal removably secured to the fuel-supporting plate, and the chamber passage or passages in the plate may be connected with the feed-water system or direct with the boiler. The said twyers may also serve to brace the upper and lower parts of the fuel-supporting plate together, and they are fed with air under pressure from the common chamber below the fuel-supporting plate.

In the accompanying drawings, which illustrate my invention, Figure 1 is a front elevation, partly in section; and Fig. 2 is a sectional elevation taken on the line A B, Fig. 1, of a marine boiler with my invention applied thereto. Fig. 3 is a plan of the fuel-supporting plate. Fig. 4 is a detail, hereinafter referred to, drawn to an enlarged scale; and Fig. 5 is a transverse section through the fuel-supporting plate, illustrating a modified mode of construction thereof.

Referring first particularly to Figs. 1, 2, and 3, *a* is the air-chamber, and *b* is the water-chamber. The walls of the air-chamber *a* consist of the lower plate of the water-chamber *b* and a shell *c*. Through the water-chamber *b* pass the twyers *d*, preferably in the form shown in Fig. 4. These twyers *d* are closed at their tops and are provided with laterally-directed nozzles *e* immediately beneath, by means of which communication is established with the air-chamber *a* through the water-chamber *b*. If the twyers are screw-threaded, as shown at *f* and *g* in Fig. 4, and are screwed into the walls of the water-chamber *b* up to their shoulders *h* and then secured in position by nuts *i*, the said twyers will form a series of stays, thereby materially adding to the strength of the water-chamber. The twyers are each preferably provided with two diametrically opposite nozzles or discharge-orifices, and the said twyers are preferably arranged in lines and alternate in position, as shown in Fig. 3. Their number is regulated in accordance with the size of the fuel-supporting plate or the number of blast-points required.



The fuel-supporting plate, with its adjuncts, after being inserted in the furnace-tube may be held therein by any suitable means, such as attachment to the furnace-front *j*.

5 The furnace-front *j* is provided with a grate-door *p* of ordinary or convenient construction, but is otherwise closed except for the pipe *q*, by which forced draft derived from a fan or equivalent means (not shown in the  
10 drawings) gains admission to the chamber *a*.

The fuel is fed onto the upper surface of the supporting-plate, where combustion is supported by the forced draft issuing through the twyers *d*. The water in the water-chamber *b* being in close proximity with the burning fuel is intensely heated. If such water-chamber is intended to form part of the feed-water system, the water will enter by the pipe *r* and be led therefrom to the hot-well by the  
15 pipe *s*, or it might be fed direct into the boiler by means of an injector, donkey-pump, or other suitable means. Alternatively, if the said water-chamber is to form part of the boiler system, thereby increasing its heating-  
20 surface and producing a rapid circulation, there are provided pipe connections *tu* (shown in broken lines in Fig. 2) between the water-chamber and the boiler proper.

Fig. 5 illustrates a simple and practical  
30 mode of constructing the water-chamber in such a way that the bottom plate can be removed without disturbing the twyers and ready access gained to the interior of the chamber for cleaning or other purposes. 8  
35 is the top plate, 9 the bottom plate, and 10 10 are the side plates. The top plate 8 is secured by rivets 11 or otherwise to the side plates 10, and the bottom plate is secured by bolts 12 or otherwise. The twyers *d* are first  
40 screwed into the top plate 8. A nut 13 may next be added. Then a nut or collar 14 is passed up the screwed stems of the twyers to the point shown in the drawings. The bottom plate 9 is fastened to the side plates 10,  
45 and finally the nuts 15 are placed in position. It will be obvious that by simply removing the nuts 15 and the bolts 12 the bottom plate

can be removed for the purpose of cleaning the chamber *b* or otherwise.

It will be apparent that material advantages and economies accrue from the adoption of the arrangements herein described, and I differentiate such arrangements from the device of a plate-grate which does not contain water, because in that case overheating  
55 and rapid destruction of the plate occurs, clinker rapidly forms and adheres thereto, and the fuel during consumption on the fuel-plate is not in intimate contact with the water to be heated. 60

In my invention the life of the fuel-supporting plate is prolonged by reason of the water circulation. The water is rapidly heated owing to the close proximity of the burning fuel. Small and cheap fuel can be  
65 employed and the same cannot percolate into the air-chamber beneath, because of the imperforate character of the plate and the closed tops of the twyers, while the air reaching the combustion-chamber being deflected later-  
70 ally is compelled to percolate the fuel and to aid complete combustion.

I claim as my invention—

The combination in a steam-generator of a combustion-chamber, a chamber into which  
75 air is forced, a fuel-supporting plate interposed between the combustion-chamber and the air-chamber and consisting of two horizontal parts arranged a suitable distance apart to provide a water-chamber between them,  
80 twyers secured to said upper and lower parts of the fuel-supporting plate and serving to brace them, said twyers being closed at the top but having openings in their sides above the fuel-supporting plate, and opening also  
85 into the air-chamber below the fuel-supporting plate.

In testimony whereof I have hereunto subscribed my name.

ROBERT SCOTT.

Witnesses:

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