

No. 689,491.

Patented Dec. 24, 1901.

W. HORNSBY, D. ROBERTS & C. JAMES.

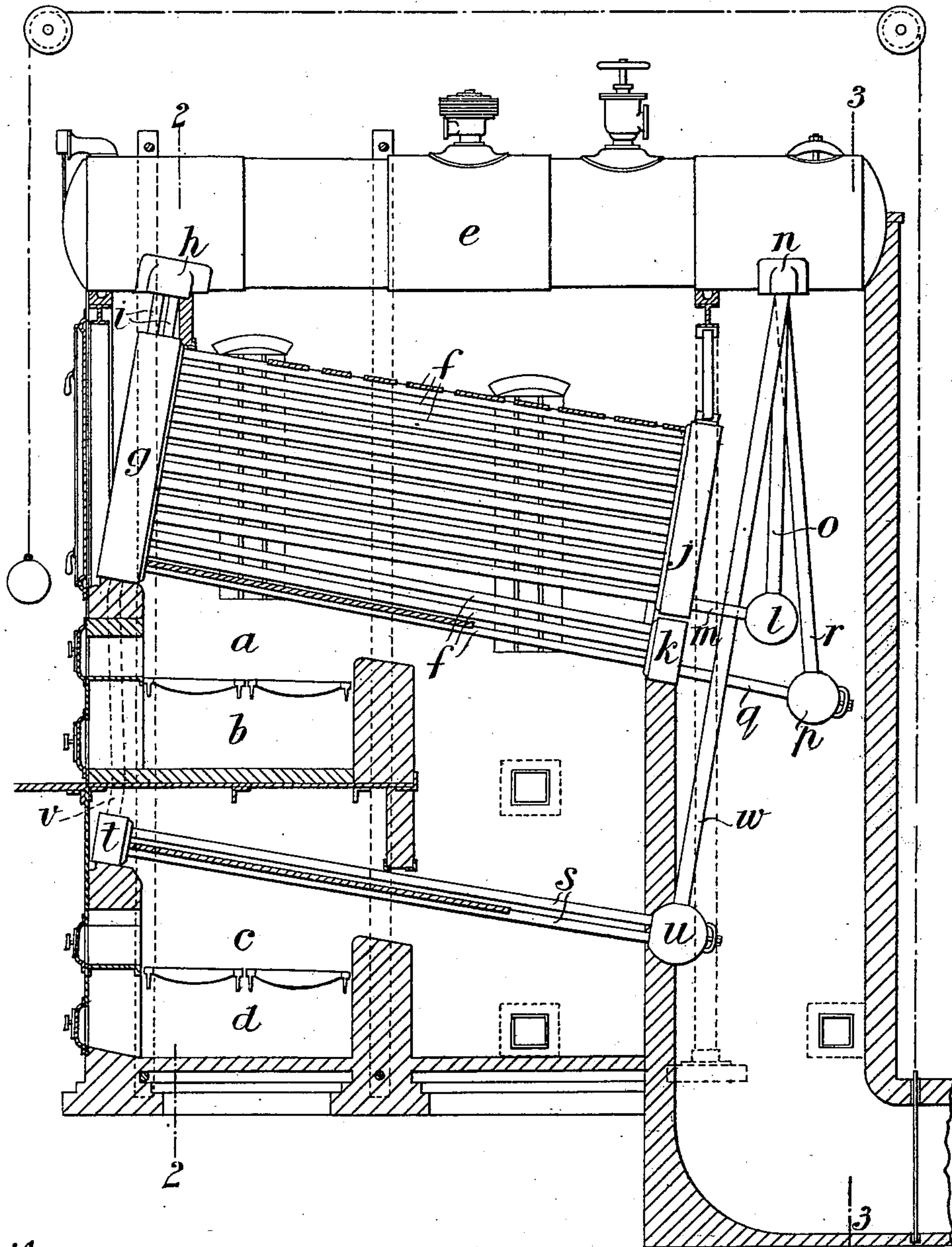
STEAM GENERATOR.

(Application filed Mar. 29, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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2 Sheets—Sheet 2.

Fig. 2.

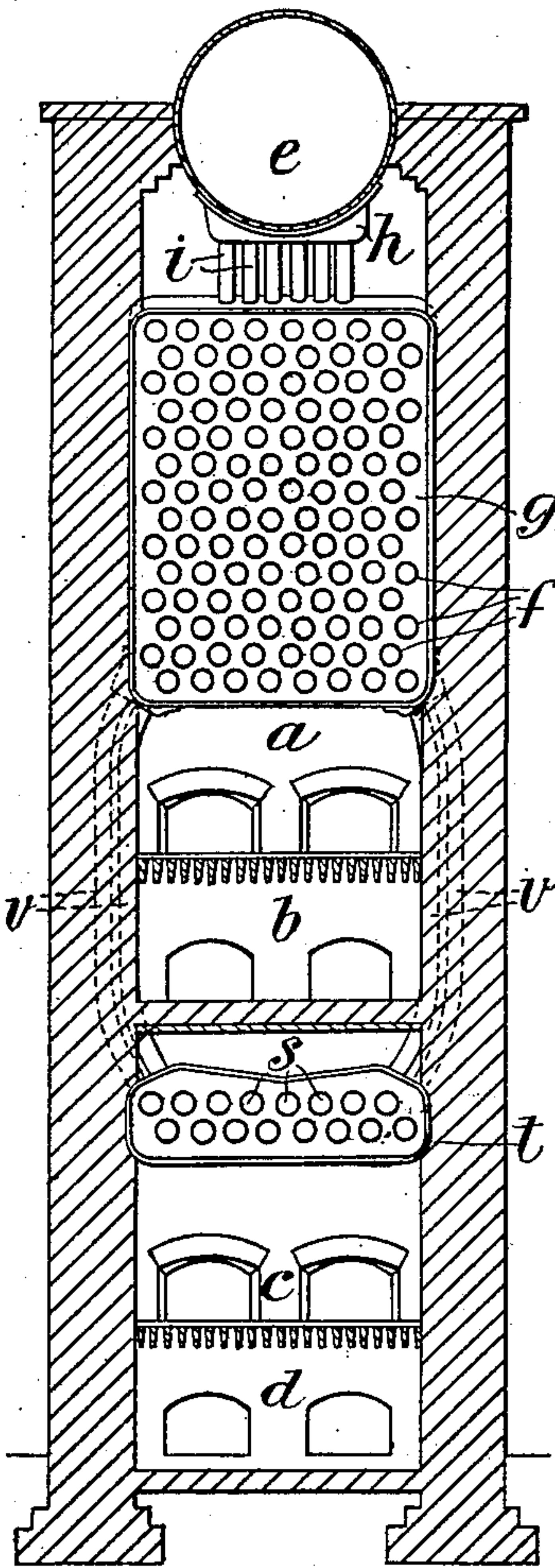


Fig. 3.

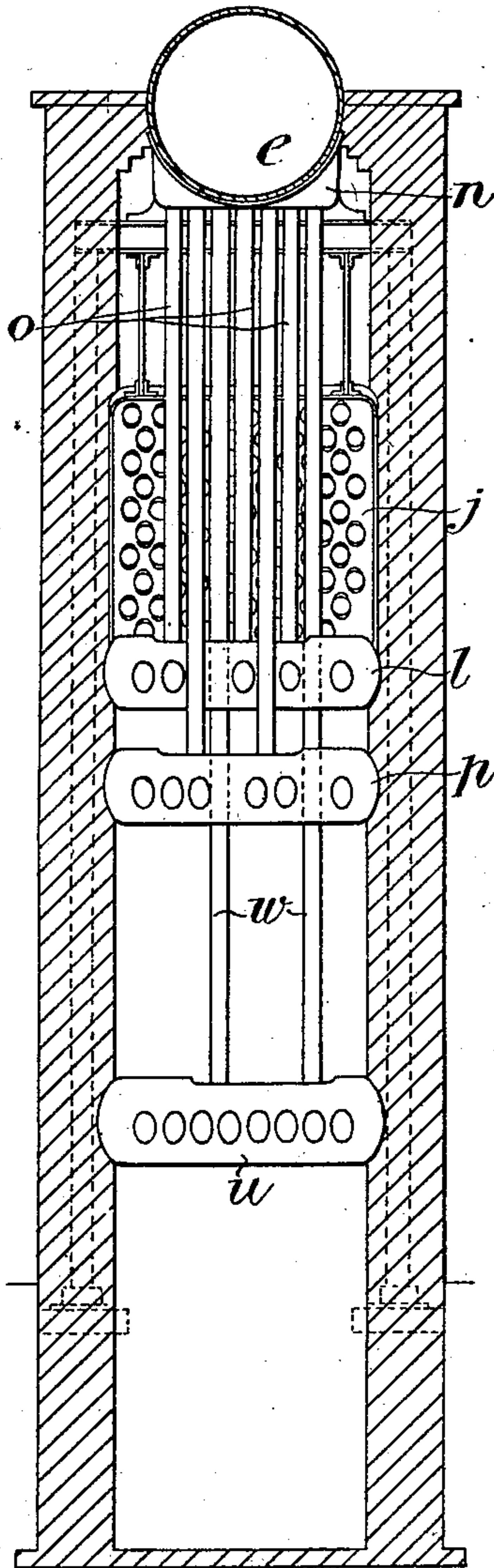
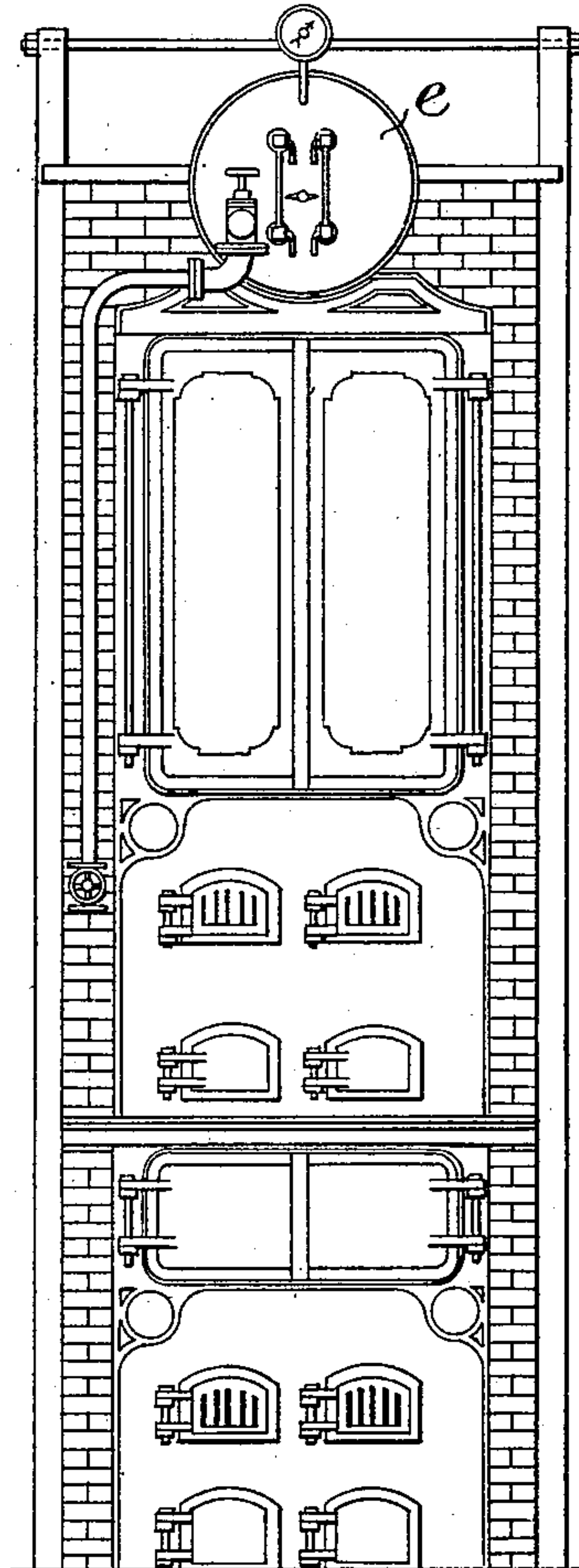


Fig. 4.



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UNITED STATES PATENT OFFICE.

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STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 689,491, dated December 24, 1901.

Application filed March 29, 1901. Serial No. 53,505. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM HORNSBY, DAVID ROBERTS, and CHARLES JAMES, subjects of the King of Great Britain, residing at Spittlegate Iron Works, Grantham, county of Lincoln, England, have invented new and useful Improvements in Steam-Generators, of which the following is a specification.

This invention relates to improvements in steam-generators of the water-tube type, wherein a series of straight, inclined, or curved tubes is arranged over upper and lower furnaces and suitably connected at either or both ends to the steam and water drum, and has for its object to obtain greater area of passageway and better circulation of the steam and water between the tubes and the steam and water drum than is usual, this being effected by making the upper front header immediately under the steam-drum and the pocket which is riveted to the steam-drum wider than is usual, so as to take two rows of nipples.

The invention has also for its object to obtain greater freedom of expansion in the tubes immediately over both the upper and lower furnaces. To insure this in the case of the two or three bottom rows of tubes over the upper furnace, we use two back headers. The said two or three bottom rows of tubes are connected to the lower back header and the remainder to the upper back header. The lower back header and the upper back header are each connected to their own mud-drums and are in turn connected by long nipples to a pocket riveted on the under side of the back end of the steam-drum. The tubes immediately over the lower furnace are connected to front and back headers in the usual way. The back header of these tubes is connected by long nipples to a pocket riveted on the under side of the rear end of the steam-drum, this construction allowing of great freedom of expansion for the said tubes.

To enable the invention to be fully understood, we will describe it by reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation of a steam-generator having the improvements applied thereto. Fig. 2 is a cross-section on the line 2 2, Fig. 1. Fig. 3 is a cross-section on the

line 3 3, Fig. 1; and Fig. 4 is a front elevation of the steam-generator.

a is the upper furnace, having the ash-pit *b*, and *c* is the lower furnace, having the ash-pit *d*.

e is the steam and water drum.

f represents the series of straight inclined tubes arranged over the upper furnace.

g is the front header, arranged under the steam-drum *e*, the said header being connected to the pocket *h*, fitted to the under side of the drum *e* by means of the two rows of nipples *i i*, both pocket *h* and header *g* being made wider than usual, so as to take the two rows of nipples.

j is the upper back header, to which the majority of the tubes *f* are connected, and *k* is the lower back header, to which the two or three bottom rows of tubes *f* are connected.

l is the mud-drum, to which the upper back header *j* is connected by the nipples *m*, the said mud-drum being also connected to the pocket *n* on the under side of the steam-drum *e* by the long nipples *o o*.

p is the mud-drum, to which the lower back header is connected by the nipples *q*, and which is also connected to the pocket *n* by the long nipples *r*.

s s are the tubes, arranged immediately over the lower furnace *c*, the said tubes being connected to the front header *t* and the back header and mud-drum *u*. The front header is connected by the tubes *v v* to the bottom of the front header *g*, and the back header *u* is connected to the steam-drum *e* by the long nipples *w w*.

By constructing steam-generators as above described we obtain a larger area of passageway and better circulation of the steam and water between the tubes and the steam and water drum than has heretofore been possible, and, furthermore, the arrangement of the two back headers and mud-drums connected thereto by nipples allows of greater freedom of expansion in the bottom rows of tubes than heretofore and also better circulation and evaporation, as the water is supplied direct to the bottom tubes, which receive the greatest amount of heat, being nearest to the furnaces.

Having now particularly described and as-

certained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In a steam-generator, the combination
5 with the steam-drum, of a water-tube section having a single header at one end and at the other end two headers located one above the other and independent connections extending from said headers directly to said steam-drum,
10 substantially as described.

2. In a steam-generator, the combination with the steam-drum, of a water-tube section comprising a single front header, two rear headers, located one above the other, water-
15 tubes connected to said front header, a portion of said tubes being connected to the upper rear header and a portion to the lower rear header, a connection between the front header and the steam-drum and independent
20 connections extending from said rear headers directly to the steam-drum, substantially as described.

3. In a steam-generator, the combination with the steam-drum, of a water-tube section
25 comprising a single front header, two rear headers located one above the other and water-tubes connected to the front header, a portion of said tubes being connected to the upper rear header and a portion to the lower

rear header, a separate mud-drum for each
30 of said rear headers, connections between the front header and the steam-drum and separate connections from each of said mud-drums to the steam-drum, substantially as described.

4. In a steam-generator, the combination
35 with the steam-drum, of a water-tube section comprising a single front header, two rear headers located one above the other and water-tubes connected to the front header, a portion of said tubes being connected to the up-
40 per rear header and a portion to the lower rear header, a separate mud-drum for each of said rear headers, connections between the front header and the steam-drum, separate connections from each of said mud-drums to
45 the steam-drum, a furnace below said water-tube section, a lower water-tube section below said furnace provided with a header connected with the upper water-tube section and a mud-drum directly connected to the steam-
50 drum and a lower furnace below said lower water-tube section, substantially as described.

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