No. 637,406. Patented Nov. 21, 1899.

J. A. PATTISON.

WATER TUBE STEAM GENERATOR.

(Application filed July 6, 1899.)

(No Model.)

Fig.1.

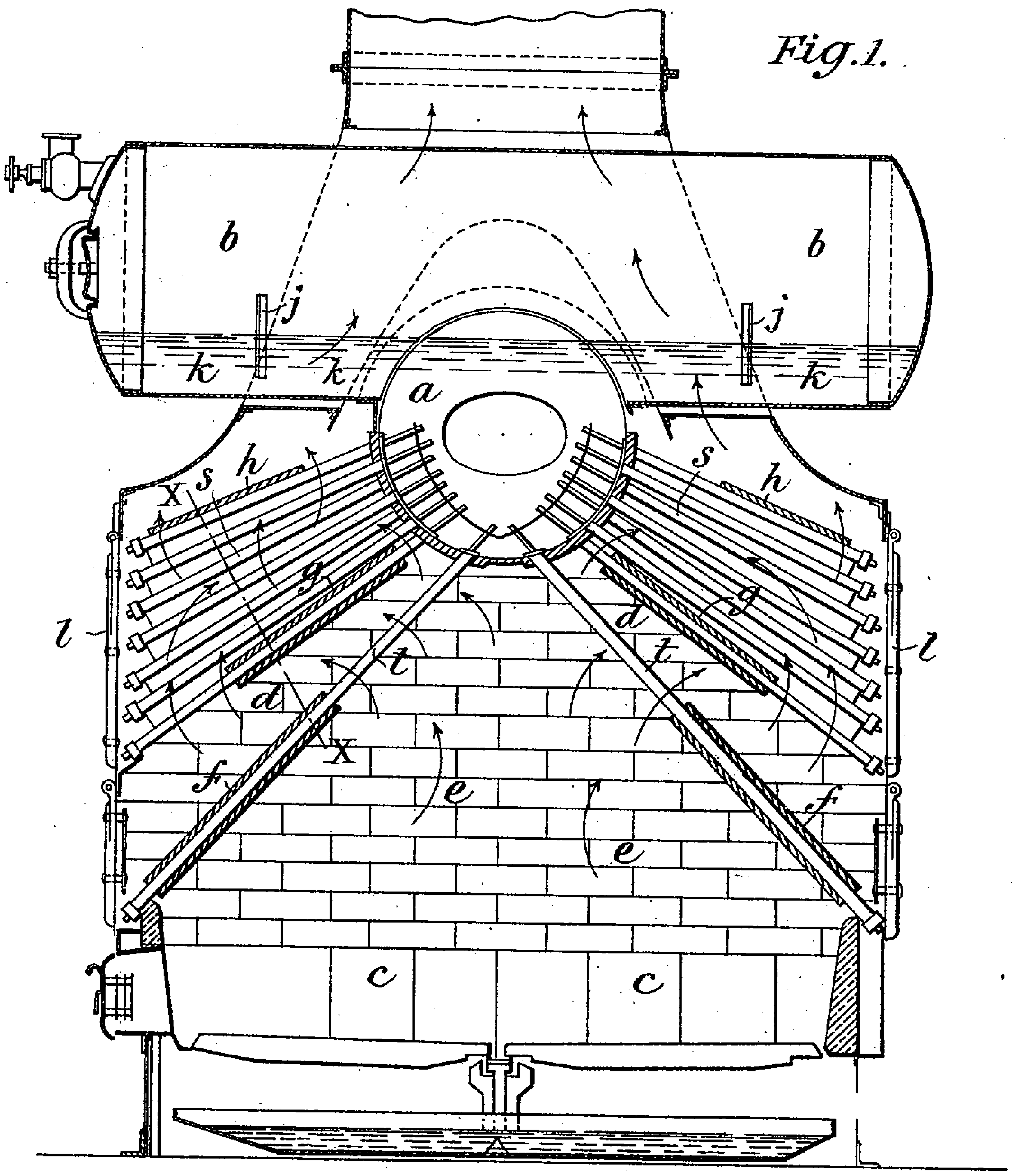
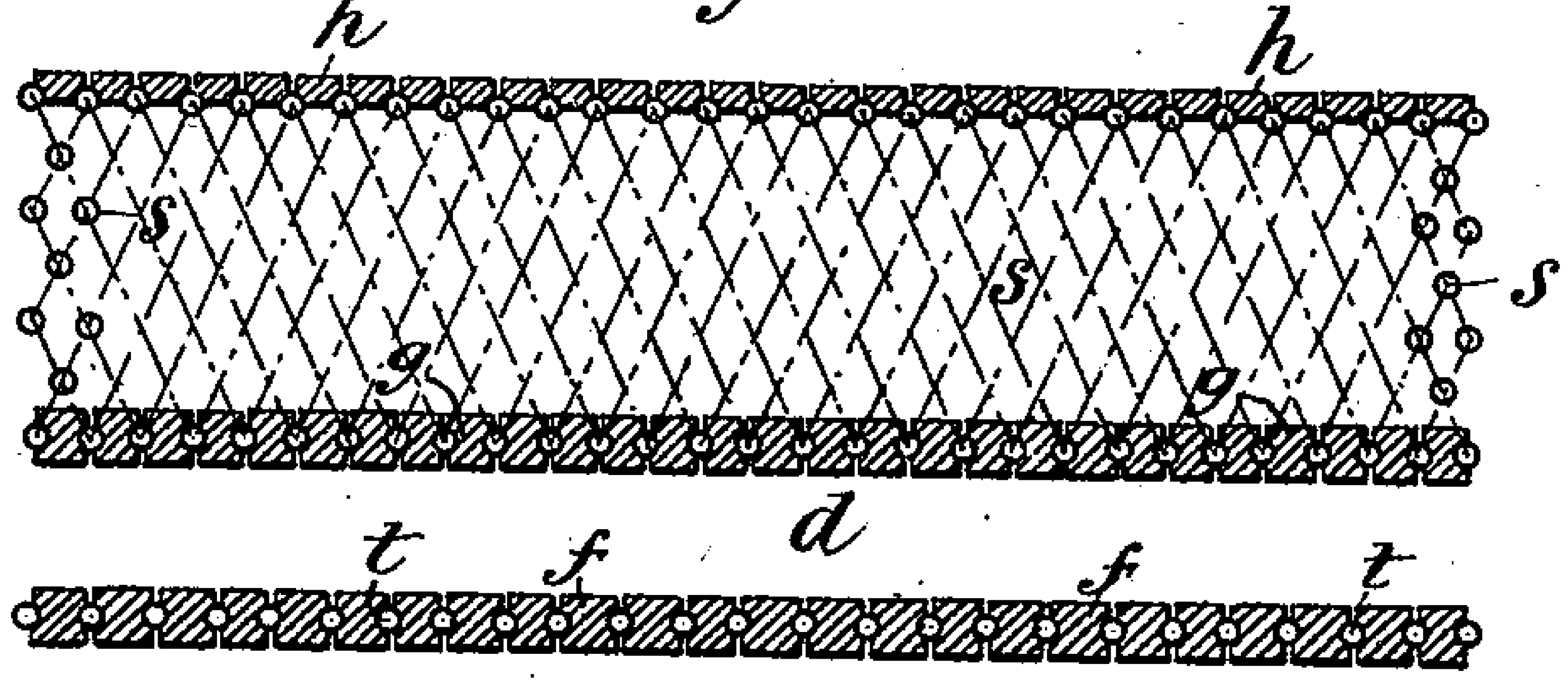


Fig.2.



WITNESSES.

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UNITED STATES PATENT OFFICE.

JOHN ALFRED PATTISON, OF NAPLES, ITALY.

WATER-TUBE STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 637,406, dated November 21, 1899.

Application filed July 6, 1899. Serial No. 722,905. (No model.)

To all whom it may concern:

Be it known that I, JOHN ALFRED PATTISON, a subject of the Queen of Great Britain, residing at Naples, Italy, have invented a certain new and useful Improvement in Water-Tube Steam-Generators, of which the following is a specification.

My invention relates to an improvement in water-tube steam-generators of the class employing "Field" tubes, in connection with an upper collector or collectors, the object of same being to so arrange the tubes in question as to provide a very perfect and effective combustion of the gases.

One means of carrying out my invention or arranging the parts is shown in the accompanying drawings, in which—

Figure 1 is a longitudinal section of a boiler, its length being in the direction in which it would be set in a vessel, to which work this type of boiler is especially adapted; and Fig. 2 is a sectional plan of the Field tubes on line *x x* of Fig. 1.

The boiler in the form shown consists of two cylindrical collectors *a b*, arranged crosswise and partly fitting into one another, the lower reservoir *a* being the water-chamber and the upper one, *b*, for its greater part a steam-chamber. From the lower collector depend two groups of Field or like tubes *s s* and two groups or rows of similar tubes *t t*, arranged somewhat apart from the first groups, such tubes *t* forming the arch of the grate *c*. The space comprised between the groups of tubes *t* and *s* forms a second combustion-chamber *d*, where the hot gases coming from the first combustion-chamber *e* are mixed and complete their combustion prior to their entering the groups *s*, through which they pass, as in a flue.

The walls or diaphragms *f* and *g* limit the first and the second combustion-chambers and, together with the wall or diaphragm *h*, guide the hot gases in the direction indicated by the arrows, so as to bring them into contact with the whole heating-surface. These diaphragms may be made in various ways, but that shown is the one preferred, this consisting, it will be seen in Fig. 2, of shaped blocks of refractory material inserted between the tubes and held in place by same, except in the case of the blocks forming the diaphragm *h*, which are partly shaped and may be held in place by any suitable means.

In the case of vessels subject to excessive rolling it may be sometimes of advantage to provide means for preventing the water moving to and fro in bulk in the collector *b*, and to this end I may employ diaphragms *j* in the latter, which will divide it up into spaces *k k k k* without, however, stopping the circulation. The arrangement of collectors and Field tubes in this type enables the tubes to be kept constantly full of water, even during the greatest rolling which ships are subject to, in case of marine-boilers the groups of tubes being so arranged that each tube is visible all over its longitudinal extent from suitable doors *l l* at the ends, and, further, it enables straight tubes to be employed, which tubes may freely expand and contract and be cleaned externally, even during the working of the boiler, while the extra combustion-chamber I provide is formed by an outer row of tubes of a straight form, which may freely expand and contract and be removed at will, so that said combustion-chamber may be quickly exposed for cleaning purposes.

What I claim is—

In a water-tube steam-generator, the combination with a casing, of a collector situated in the upper part of same, a grate beneath said collector, doors in the casing, a group of water-circulating tubes connected at one end to the collector, of the type having a closed end and an internal diaphragm, the other end of said tubes terminating opposite the doors, a wall partly closing the space between the outer tubes of the group so as to form such group into a flue and a further group of similar tubes connected to the collector, and terminating opposite the doors but spaced apart from the front group so as to form a chamber between, and a wall partly closing the spaces between the tubes of said group so that the gases from the grate beneath enter the combustion-chamber of the two groups between a portion only of said tubes.

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

JOHN ALFRED PATTISON.

Witnesses:
CHARLES CANGLY,
VICTOR G. HEISER.