No. 666,820. Patented Jan. 29, 1901.

C. SAMSON.

STEAM BOILER.

(Application filed Sept. 4, 1900.)

(No Model.) 3 Sheets—Sheet 1.

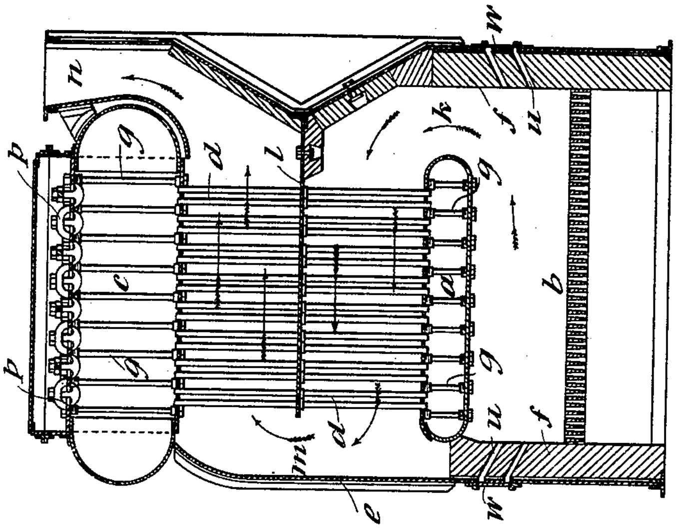

Fig. 2.

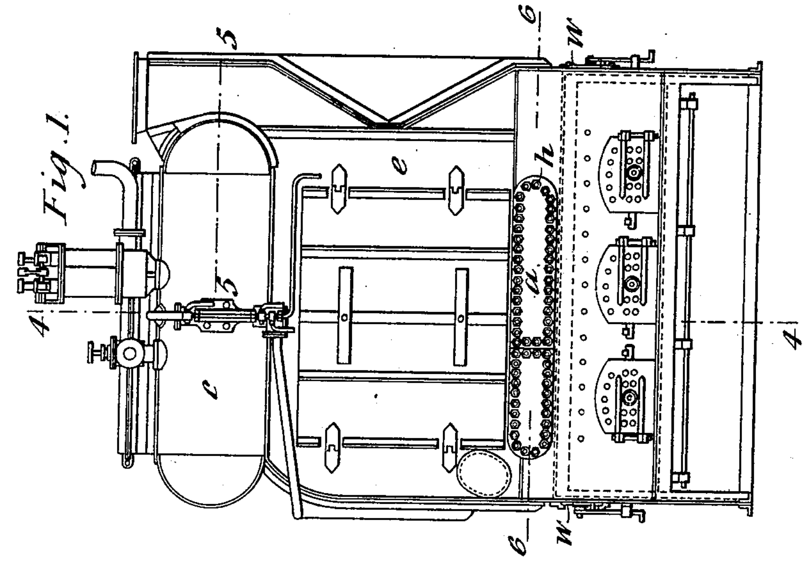

Fig. 1.

WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

Fig. 4.

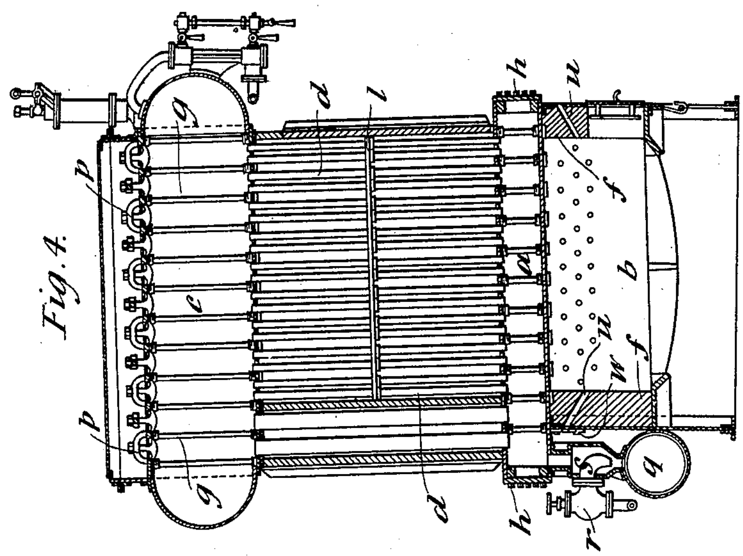
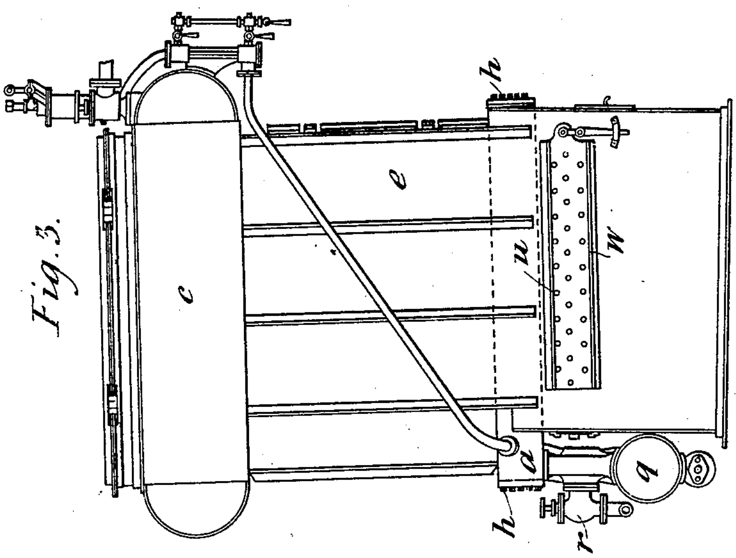


Fig. 3.



WITNESSES

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 666,820. Patented Jan. 29, 1901.

C. SAMSON.

STEAM BOILER.

(Application filed Sept. 4, 1900.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 6.

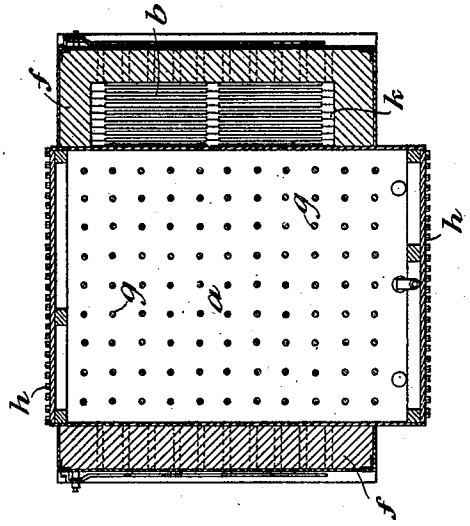
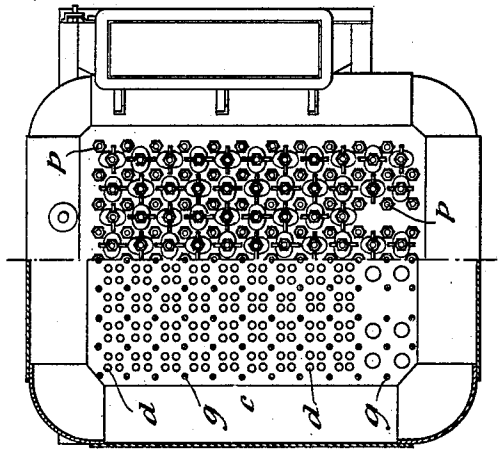


Fig. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

CAMPBELL SAMSON, OF DEVONPORT, ENGLAND.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 666,820, dated January 29, 1901.

Application filed September 4, 1900. Serial No. 28,909. (No model.)

To all whom it may concern:

Be it known that I, CAMPBELL SAMSON, a citizen of England, residing at The Royal Naval Engineers' College, Keyham, Devonport, in the county of Devon, England, have invented certain new and useful Improvements in Water-Tube Steam-Boilers, (for which I have applied for a patent in Great Britain, dated February 26, 1900, No. 3,726,) of which the following is a specification.

According to my invention I construct water-tube steam-boilers as I shall describe, referring to the accompanying drawings.

Figure 1 is a front view. Fig. 2 is a transverse section. Fig. 3 is a side view. Fig. 4 is a section on the line 4 4 of Fig. 1, also Fig. 5 is in its left half a top plan with casing removed and in its right half a sectional plan on the line 5 5 of Fig. 1, while Fig. 6 is a sectional plan on the line 6 6 of Fig. 1.

The boiler is composed, first, of a lower water-chamber *a* of a flattened rectangular form extending over the furnace-grate *b* and constituting the crown of the furnace; secondly, of an upper steam-and-water chamber *c*, also of a flat rectangular form, of a larger size than the lower chamber *a* and situated at some height above the latter, and, thirdly, of a series of vertical water-tubes *d*, secured at the upper end, by expanding or otherwise, to the under side of the upper water-and-steam chamber *c* and at the lower end to the upper side of the lower water-chamber *a*.

The upper and lower chambers *c* and *a* are suitably supported in an inclosing sheet-metal casing *e*, lined where necessary, as at *f*, with fire-brick. The chambers *a* and *c* are stayed internally by vertical stay-bars *g*, secured by screwing or otherwise to the top and bottom of each chamber at points intermediately between the water-tubes *d*. The front and back ends of the lower water-chamber extend through the casing and are there provided with covers *h*, bolted on, so that on removing these access is gained to the interior of the chamber for clearing it of scale, for fixing the water-tubes therein, and generally for inspection. The two sides of the lower chamber are preferably rounded, the one side being in contact with the lining of the casing, while between the other side and the side of the casing an opening *k* is left for the upward passage of the flames and combustion-gases from the grate *b*.

At an intermediate point between the upper and lower chambers a horizontal partition *l* is provided, extending from the casing on the side where the flames and gases rise through the opening *k* right across the water-tubes to within a certain distance of the other side of the casing, so as to leave an opening *m*. By this arrangement the flames and gases are made to pass from the fire-grate first from left to right in contact with the under side of the lower water-chamber *a*, then from right to left transversely between the lower parts of the water-tubes and in contact with the upper surface of the lower water-chamber *a*, then from left to right again between the upper parts of the water-tubes and in contact with the under side of the upper water-and-steam chamber *c*, and finally the gases pass up through a space *n* between the right side of the upper chamber and casing to the uptake.

The upper chamber *c* preferably has all four sides made of rounded form. In its upper side are formed a number of hand-holes closed by covers *p*, through which access can be gained to the interior for fixing the water-tubes, for clearing the chamber of scale, and for inspection generally. The horizontal partition *l* consists, preferably, of perforated plates or slabs of a refractory character which rest upon collars or projections fixed or formed on the outer surfaces of the water-tubes.

At the back of the boiler is provided a mud-collector consisting of a horizontal tubular chamber *q*, arranged below the projecting back end of the lower water-chamber *a* and connected at each end thereto by a connecting-pipe. The feed-valve *r* discharges through a nozzle *s*, which is introduced into one of the end connecting-pipes, where it is turned downward, so that the downward current of feed-water induces a downward circulation from the water-chamber *a* into the mud-chamber *q* through the one connecting-pipe and an upward circulation through the other connecting-pipe.

At each side of the fire-grate there are formed, above the latter, several rows of small air-channels *u*, extending through the casing, for admitting air in regulated quantities

above the fire-grate for consuming smoke. For regulating this air-supply there are provided on the outer sides of the casing sliding plates *w*, Fig. 3, having holes corresponding to the said air-channels, so that by moving these plates they are made to more or less cover or uncover the air-channels, and thus regulate the upper air-supply. A similar row of air-channels may also be provided at the front and back walls of the casing. The air-supply below the grate may be regulated in any known manner.

A sufficient number of the water-tubes at the back end of the boiler are made of larger diameter than the rest, so as to serve as down-flow-tubes, while the others serve as the up-flow-tubes.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim—

1. A water-tube boiler, comprising a lower box-like water-chamber, an upper flattened steam-and-water chamber, a series of vertical tubes connecting the chambers, the upper chamber having hand-holes in its top to give access to the upper ends of the tubes, a fire-grate extending beneath the lower chamber, and a baffle arranged to give the gases a double horizontal pass among the tubes; substantially as described.

2. A water-tube boiler, having a lower drum with exterior depending connections leading to a mud-collector, and a feed-pipe entering one of the said connections and extending downwardly; substantially as described.

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

CAMPBELL SAMSON.

Witnesses:
JOHN MOULE,
WM. J. BROWNE.