(No Model.)

G. F. NILSSON.

BOILER.

No. 382,722. Patented May 15, 1888.

Fig. 1.

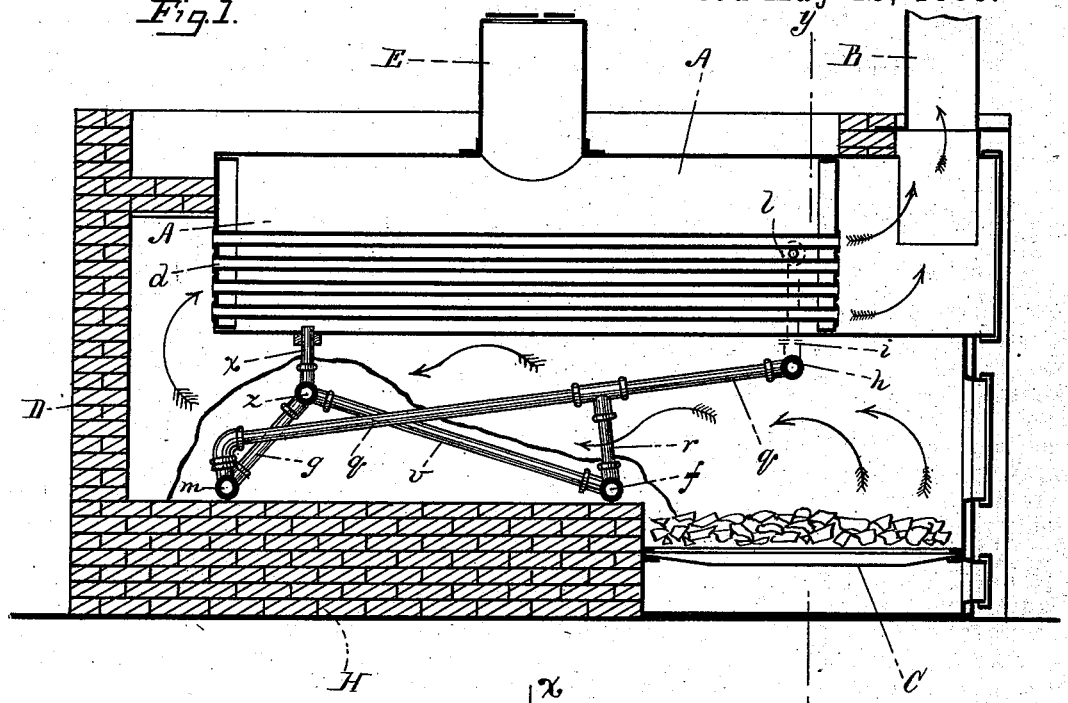
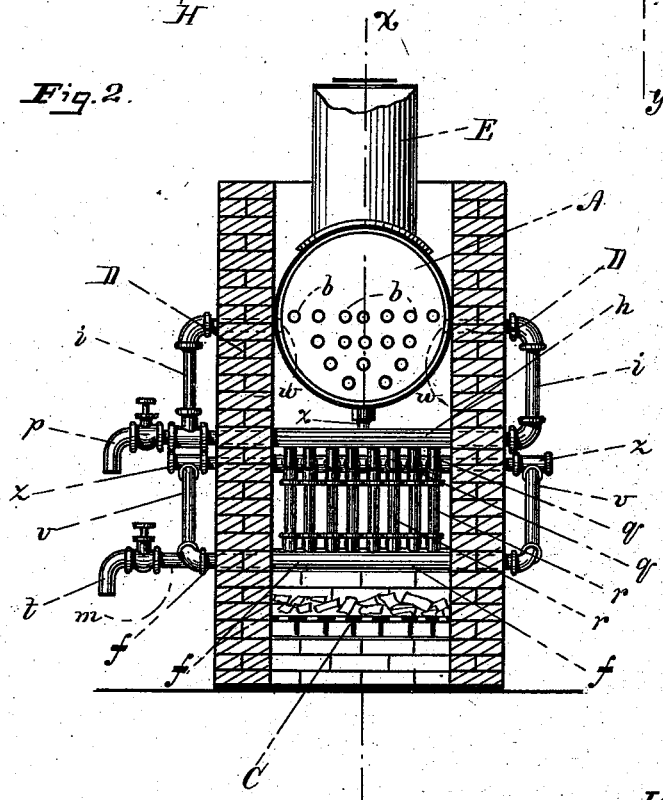


Fig. 2.



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UNITED STATES PATENT OFFICE.

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BOILER.

SPECIFICATION forming part of Letters Patent No. 382,722, dated May 15, 1888.

Application filed February 23, 1888. Serial No. 264,907. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. NILSSON, of Belmont, in the county of Middlesex, State of Massachusetts, have invented a certain new and useful Improvement in Boilers, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical longitudinal section of my improved boiler and its casing, taken on line *x x* in Fig. 2; and Fig. 2, a vertical transverse section of the same, taken on line *y y* in Fig. 1.

Like letters and figures of reference indicate corresponding parts in the different figures of the drawings.

My invention relates more especially to that class of boilers which are used for heating purposes, both with steam and hot water; and it consists in the certain novel features hereinafter fully set forth and claimed, the object being to produce a simpler and more effective device of this character than is now in ordinary use.

The nature and operation of the improvements will be readily understood by all conversant with such matters from the following explanation.

In the drawings, A represents the boiler proper, B the chimney or smoke-stack, C the fire-box, and D the casing, these parts being all of the ordinary form and construction. The boiler A is also supplied with a steam-dome, E, and flues *b*, in the usual manner. A vertically-arranged pipe, *x*, enters the under side of the boiler near the rear end thereof, a horizontally-arranged pipe, *z*, being centrally connected to the lower end of the pipe *x* and extending out through the casing D at each side thereof, as shown in Fig. 2. A longitudinally-arranged inclined pipe, *v*, connects each end of the pipe *z* with the end of a horizontally-arranged pipe, *f*, which rests on the bridge-wall H, near the fire-box, and extends through the casing D, said pipes *v* being also outside said casing. A horizontally-arranged pipe, *m*, is disposed on the bridge-wall H below the rear end of the boiler, said pipe extending through the casing D and being provided with a valve or faucet, *t*, (see Fig. 2,) at one end. Two short inclined pipes, *g*, (see Fig. 1,) connect the ends of the pipe *z* with those of the pipe *m* outside the casing. A horizontally-arranged pipe, *h*, is disposed beneath and near the head of the boiler, said pipe passing through the casing D. A vertically-arranged pipe, *i*, is secured to each end of the pipe *h* and passes back through the casing into the boiler A at *l*, or just below the water-line, one end of the pipe *h* being provided with a valve or faucet, *p*. Eight longitudinally-arranged inclined pipes, *q*, connect the pipe *h* with the pipe *m*, and a corresponding number of vertically-arranged pipes, *r*, connect the pipes *q* with the pipe *f*.

In the use of my improvement the boiler A is filled with water, in the usual manner, which passes into and fills the pipes described. Fire being started in the fire-box, the pipe *h* and adjacent portions of the pipe *q* become heated first, causing the heated water in said pipes to rise through the pipes *i* into the boiler just below the water-line, thereby producing a circulation of water between the boiler-system of pipes beneath it, which becomes continuous. The heated air, smoke, and products of combustion from the fire-box pass in the direction indicated by the arrows in Fig. 1, through the flues *d* of the boiler, in the usual manner, thus keeping the water in said pipes constantly heated to a high temperature. Steam is taken from the boiler A for heating purposes in the usual manner, and by attaching pipes to the valves *p t* hot water may be conducted to any position desired and a continuous circulation kept up through the same, as described. Moreover, by using my system of pipes I find that the boiler A may be constructed about one-third the size ordinarily required to produce a given result, thus effecting a great saving in the cost of construction.

I do not confine myself to using any specific number of the pipes *r q*, as they may be varied to suit the size of boiler or in accordance with the circumstances of the case.

Having thus explained my invention, what I claim is—

1. In a boiler of the character described, the combination of the following instrumentalities, to wit: a body, a vertical pipe tapping said body at the rear on the under side thereof, a

transversely-arranged pipe connected centrally with said vertical pipe and extending through the boiler-casing, a transversely-arranged pipe disposed on the bridge-wall near the fire-box and extending through the casing, inclined pipes connecting the ends of said transverse pipes outside the casing, a transversely-arranged pipe disposed on said bridge-wall under the rear end of the boiler and extending through the casing, the ends of said pipe being connected with the transverse pipe which is connected with said vertical pipe, a transversely-arranged pipe passing through the casing near the forward end of the boiler, inclined pipes connecting said pipe with the transverse pipe at the rear of the bridge-wall, and vertical pipes connecting the ends of the transverse pipes and the body of the boiler below the water-line, all being arranged to operate substantially as set forth.

2. In a boiler, the body or boiler proper, A, having the flues *d* and dome E, the vertical pipes *x r i*, transverse pipes *z m f h*, inclined pipes *q v g*, bridge-wall H, and casing D, combined and arranged to operate substantially as set forth.

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