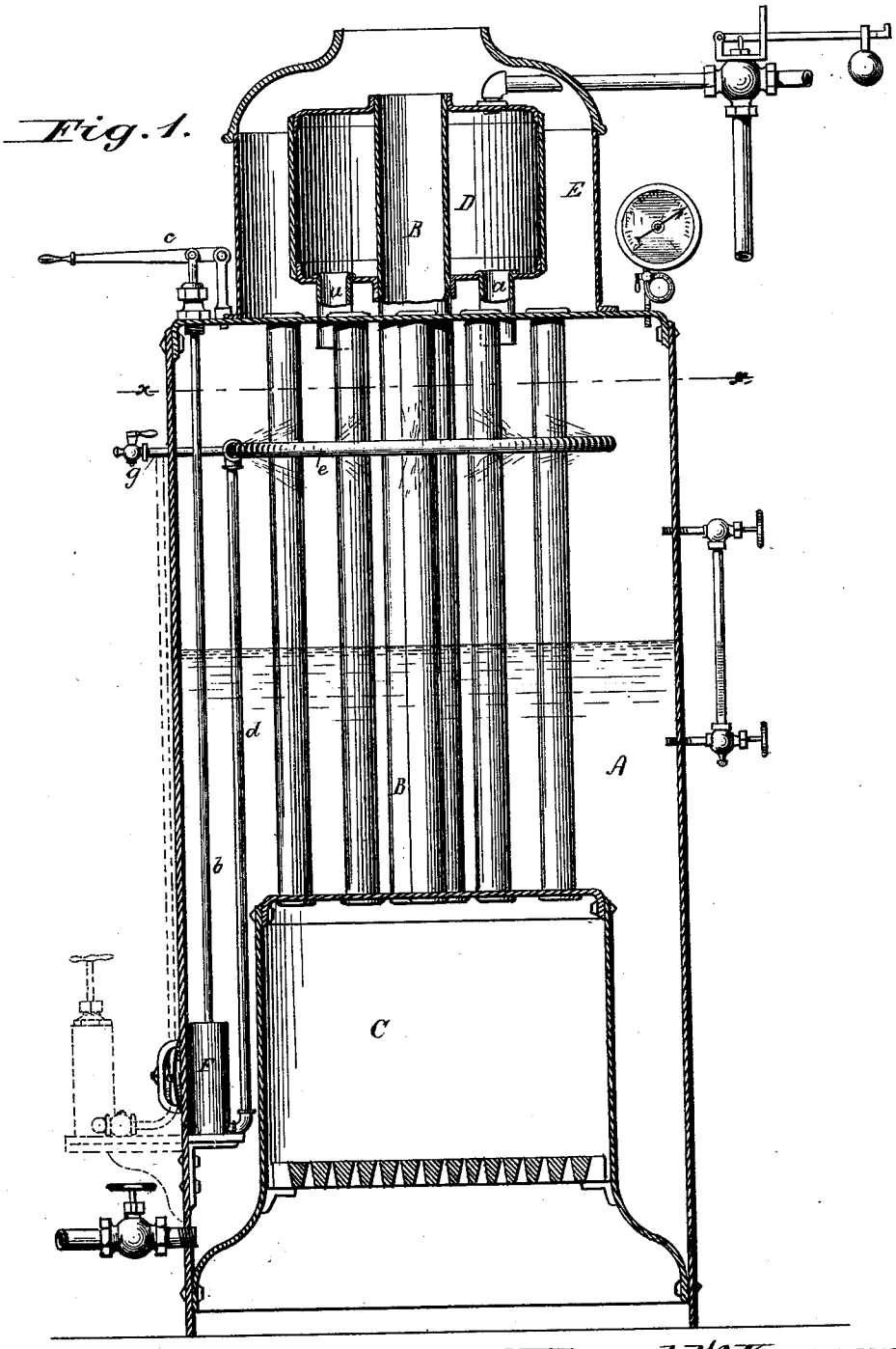
3 Sheets—Sheet 1.

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Steam-Boiler Attachment.

No. 218,542. **Patented Aug. 12, 1879.**

Fig. 1.



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Fig. 2.

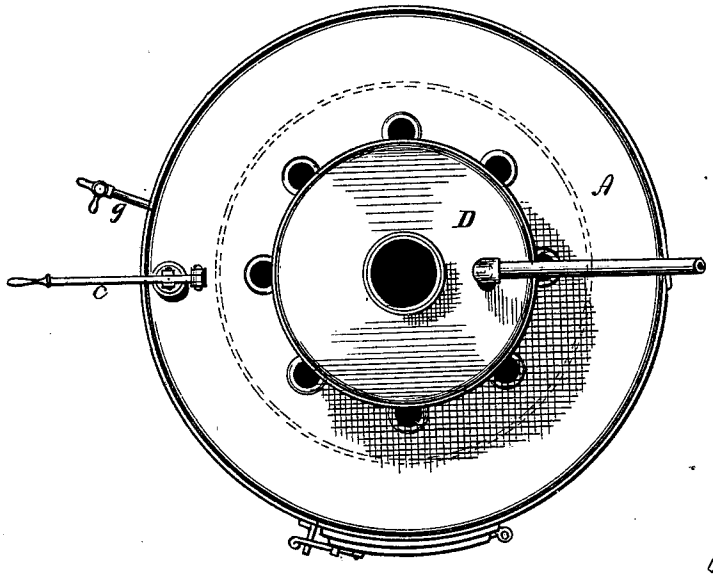


Fig. 6.

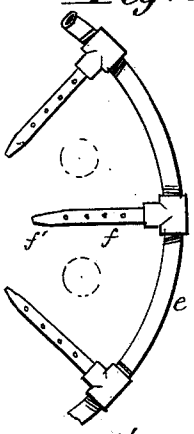


Fig. 3.

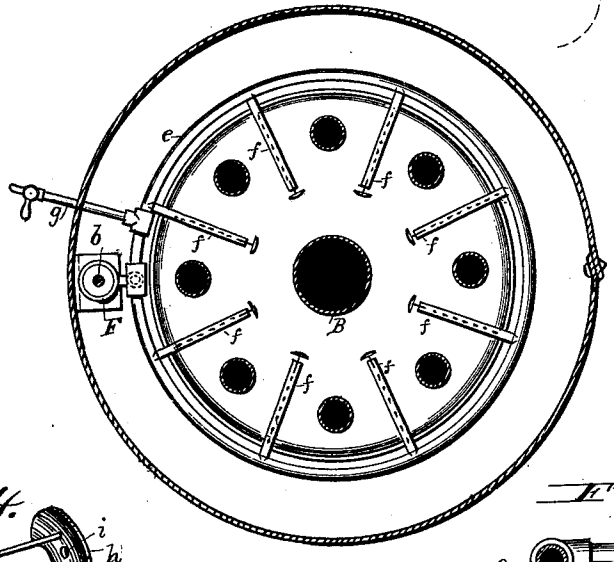


Fig. 6'.

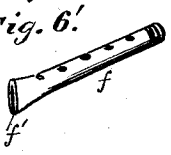


Fig. 4.

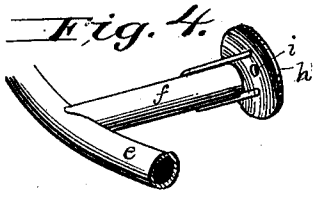
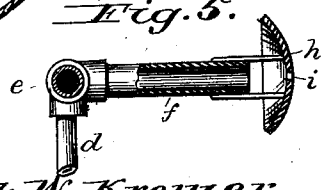


Fig. 5.



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Fig. 7.

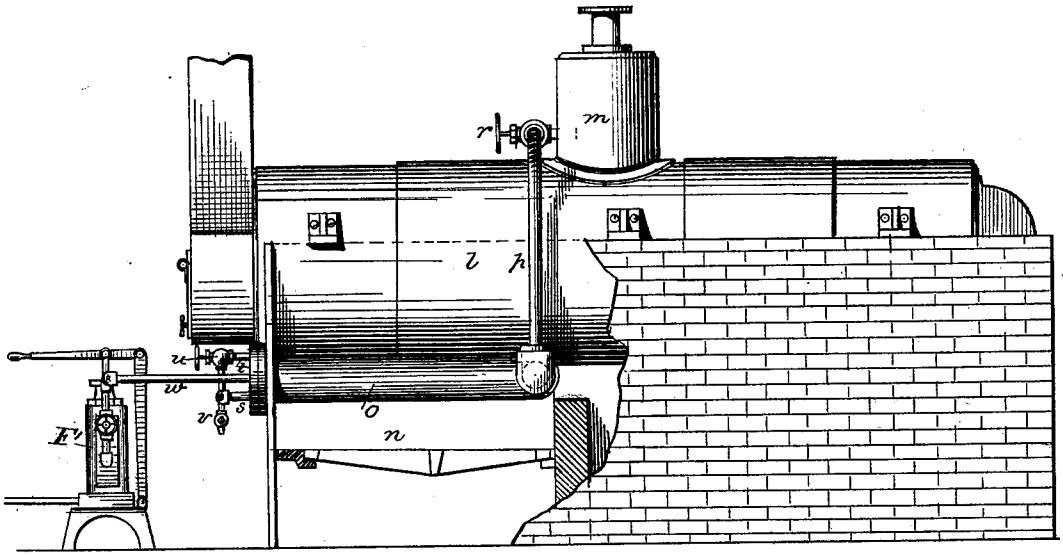


Fig. 9

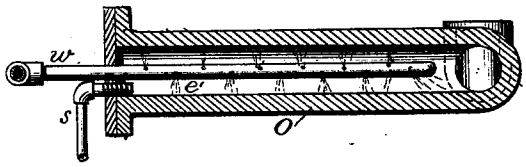
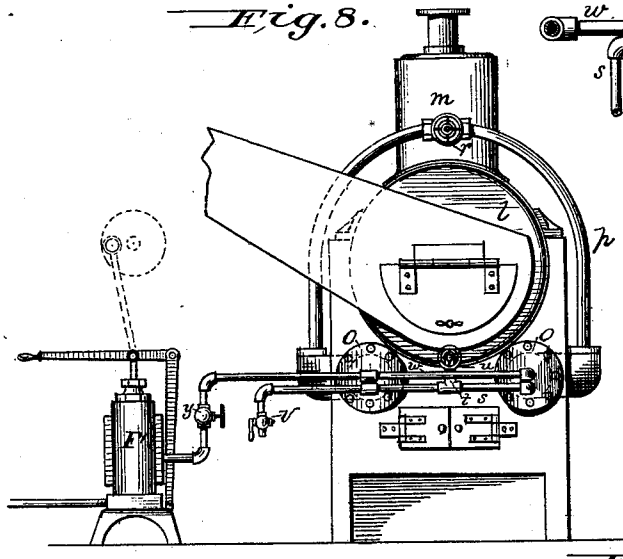


Fig. 8.



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UNITED STATES PATENT OFFICE.

FRANK W. KREMER, OF AKRON, OHIO, ASSIGNOR TO J. F. FAHS AND A. C. BELDEN, OF SAME PLACE, ONE-THIRD TO EACH.

IMPROVEMENT IN STEAM-BOILER ATTACHMENTS.

Specification forming part of Letters Patent No. **218,542**, dated August 12, 1879; application filed July 22, 1879.

To all whom it may concern:

Be it known that I, FRANK W. KREMER, of Akron, in the county of Summit, in the State of Ohio, have invented certain new and useful Improvements in Steam-Boiler Attachments, of which the following is a full, clear, and exact description.

My invention relates primarily to an attachment for steam-boilers for the increased generation of steam at short notice, it being applicable for continuous use in steam-generation.

The invention consists in the instantaneous production of steam by forcing the hot water of the boiler through spray-tubes onto heated surfaces by means of a force-pump.

In the drawings illustrating my invention, Figure 1 is a central vertical section of an upright steam-boiler having my invention applied. Fig. 2 is a top-plan view. Fig. 3 is a cross-section taken on a horizontal plane, *x x*, of Fig. 1, just below the steam-dome; Fig. 4, a perspective, and Fig. 5 a partial sectional view, of one form of spray-tube; Fig. 6, a top plan, and Fig. 6′ a perspective view, of another form of spray-tube. Fig. 7 is a side elevation of my apparatus as adapted for stationary horizontal or locomotive engines; Fig. 8, an end view, and Fig. 9 a longitudinal section, of the generating-retort as employed in horizontal boilers or engines.

The letter A designates an upright boiler of any approved construction. Preferably the boiler has an enlarged central fire-flue, B, extending from the furnace C through the steam-dome D. The usual smoke-chamber E, leading to the smoke-stack, may surround the steam-dome, the flues leading into said chamber. The boiler proper and dome are connected by steam-pipes *a a*.

F is a pump, placed within the water-jacket of the boiler-furnace. This pump is a force-pump, and takes the water from the boiler and forces it up a pipe, *d*, through a circular pipe, *e*, and thence through spray-pipes *f* onto the heated fire-flues, upon coming into contact with which it is instantly converted into steam.

The pump may have its piston-rod *b* extended up through the boiler and operated by a hand-lever, *c*. It may also be operated by a steam-driven mechanism.

The circular pipe *e* may encircle the flues, and its spray pipes or tubes radiate inwardly from it in such manner as to permit the escape of the water against the flues.

The spray-tubes are susceptible of various constructions, some of which are illustrated. In Figs. 4 and 5 the tubes are straight pieces of pipe with open or partially closed ends, having a cup, *h*, attached thereto for spreading the water in a film, and in which an opening or openings, *i*, is made to divide the water into spray. In Figs. 6 and 6′ the tubes have small orifices in them, and their ends *f′* are flattened for the same purpose.

In applying my apparatus to boilers already built it may be necessary to attach the pump and the pipe *d* outside, as illustrated by the dotted lines in Fig. 1; but the best arrangement is to place the pump within the water-jacket of the furnace, where it is kept hot, and the water used for spraying is prevented from cooling in forcing it to the spray-tubes, whereby steam is more readily generated.

It will be noticed that in my invention hot water is thrown forcibly against hot surfaces in a finely-divided state, and thereby is certainly and instantaneously converted into steam. All the steam generated is conducted into the steam-dome D, and by having the fire-flue B of large diameter a large heating-surface is introduced into the steam-dome, and its contained steam thereby superheated.

The circular pipe *e* is provided with a blow-off, *g*, whereby it may be cleansed of sediment, and its spray-tubes thereby kept free to make spray effectively.

This apparatus may be kept in constant use in making steam, or may be only occasionally used, when an excess of steam is required for emergency.

To apply my invention to horizontal boilers, whether stationary or locomotive, a modification of the construction is necessary. I have shown such modification in Figs. 7, 8, and 9.

The letter *l* represents a boiler having the usual steam-dome *m* and furnace *n*. Within the furnace are arranged so as to be in direct contact with the fire two (more or less) retorts, *o*, of strong metal, cast, preferably, but of other construction, if desired. I have

shown two such retorts. They are connected at their inner ends by a pipe, *p*, which leads to the steam-dome, and has a cock or valve, *r*, inserted at its juncture with the dome. *s* is a pipe connecting the two retorts at their lower front ends, and having a branch pipe, *t*, uniting it with the lower portion of the boiler, at which point it (the said branch pipe) is provided with a cock or valve, *u*. The pipe *s* is also provided with a terminal cock, *v*. The retorts are provided with longitudinal spray pipes or tubes *e'*, having a number of orifices in them, and these pipes are united to a pipe, *w*, which is provided with a cock or valve, *y*, and is connected to a force-pump, F'. This pump is suitably located with reference to the boiler, may take its water from the boiler or heater, and is hand or steam driven, as indicated.

In the operation of this form of apparatus, water is turned from the boiler, by cock *u*, into the retorts until such retorts are heated. The water is then shut off and escapes, through the pipe *s*, out at cock *v*. The pump is then set in motion and water forced through pipe *w* and the spray-tubes *e'*, whence, coming into contact with the hot surface of the retorts in a finely-divided state, it is, as before, instantaneously converted into steam. The steam escapes through the pipe *p* and cock *r* into the steam-dome. The cock or valve *r* should, of course, be of such construction as to prevent the escape of steam from the dome.

The cock *y* is used to prevent back-flow of water from the retorts in the first heating, this filling of the retorts for the first heating with water being to prevent the burning out of the said retorts.

What I claim is—

A boiler provided with an auxiliary steam-generating mechanism composed of a force-pump adapted to be attached to, but forming no integral part of, an ordinary boiler, and taking the hot water from the boiler, a spray-tube through which the pump forces the water, and heated metallic surfaces against which the water is sprayed, and thereby instantly converted into steam, substantially as shown and described.

To the above specification of my invention I have signed my name this 21st day of December, A. D. 1878.

FRANK W. KREMER.

Witnesses:

JOSEPH F. FAHS,

NAPOLEON C. BARTON.