

L. J. BAYER.
 SOOT BOILER CLEANER.
 APPLICATION FILED OCT. 9, 1912.

1,066,244.

Patented July 1, 1913.
 2 SHEETS-SHEET 1.

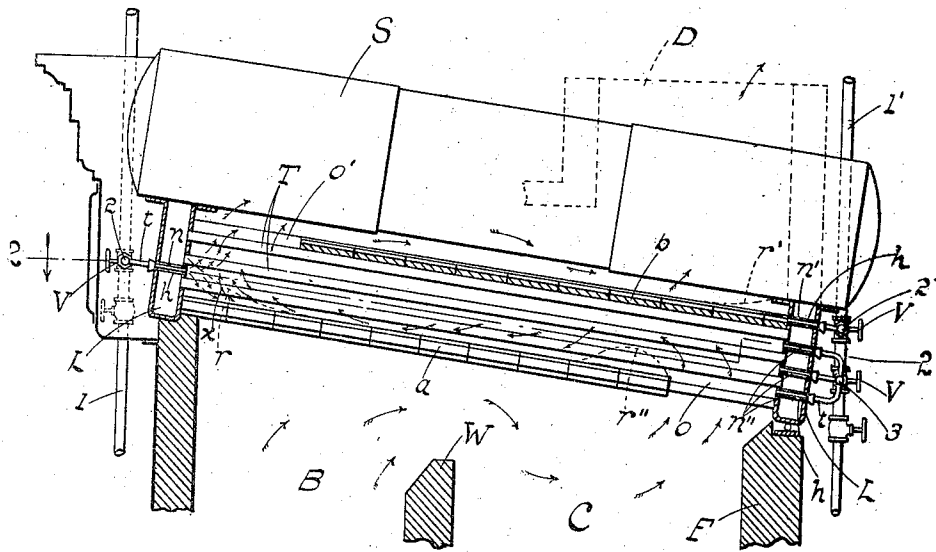


FIG. I.

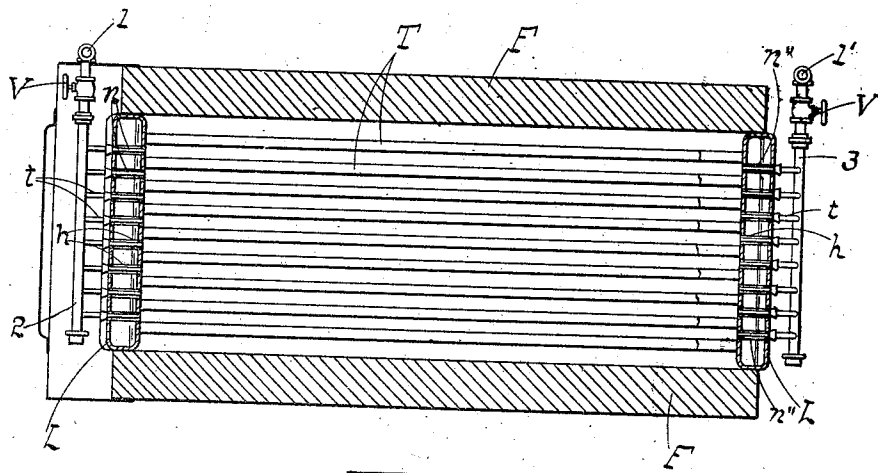


FIG. 2.

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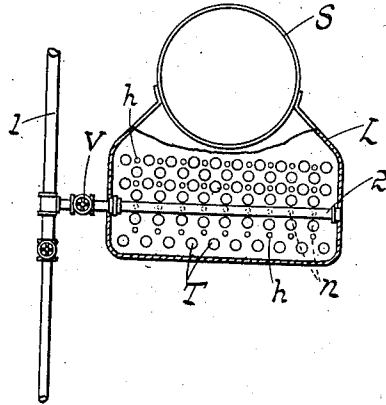


FIG. 3.

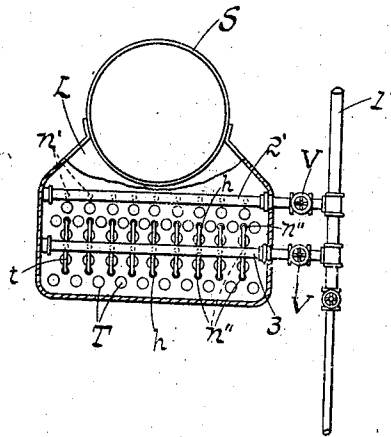


FIG. 4.

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UNITED STATES PATENT OFFICE.

LEO JNO. BAYER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO BAYER STEAM SOOT BLOWER COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

SOOT BOILER-CLEANER.

1,066,244.

Specification of Letters Patent.

Patented July 1, 1913.

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To all whom it may concern:

Be it known that I, LEO JOHN BAYER, citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Soot Boiler-Cleaners, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in soot boiler-cleaners or blowers; and it consists in the novel features of construction more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a sectional side elevation of a water-tube boiler of the Heine-type showing my invention applied thereto; Fig. 2 is a horizontal section on the zig-zag line 2—2 of Fig. 1; Fig. 3 is a front elevation of the boiler showing my blower in place; and Fig. 4 is a rear elevation thereof with my blower in position.

The present invention is an improvement on the general class of soot boiler-cleaners (adapted for the Heine or Heine-type of boiler) forming the subject-matter of U. S. patents numbered 900,078, dated October 6, 1908; 919,680, dated April 27, 1909, granted to Frank X. Bayer; and 1,032,583 issued to me under date of July 16, 1912. The improvement herein is specifically directed to a horizontally baffled Heine (or Heine-type) boiler of the shallow type, that is to say one in which the top and bottom baffles are relatively near each other, thereby forming a comparatively narrow flue or passage between them. This is the case where the depth (or height) of the boiler below the shell or drum does not exceed six or seven tubes (measured vertically along the tube area of either water-leg).

The object sought is to so position the front cleaning nozzles relatively to the baffles, that one set of nozzles will perform the function of what previous to my invention was accomplished by two such sets (or rows). In the blowing or cleaning operation, not only is it necessary that the soot and dirt shall be dislodged from the water tubes (and other parts of the boiler) but that the material so dislodged should be carried out of the stack by the draft of the furnace. The blowing nozzles must therefore be so positioned as not to interfere with the draft, but on the contrary assist it or operate in

conjunction therewith. In all horizontally baffled Heine (or Heine-type) boilers one of the zones of soot precipitation is against the front water leg at the front of the bottom baffle, another zone being at the rear of the top baffle in the region of the stack. Previously in the art, the bottom row of front nozzles was employed to agitate and dislodge the material accumulating in the first zone of precipitation mentioned, a second set of nozzles (relatively close to the shell, or at least above the center of the tube area) being employed in the front to operate in conjunction with the draft for carrying the material rearwardly over the front end of the top baffle into the space between said baffle and the boiler shell, the rear top set of nozzles agitating the material in the region of the base of the stack, thus causing the entire mass of dislodged material to find its way to and out of the stack. In my present improvement I dispense with the upper set of front nozzles thus cutting down the expense of material and installation, and so position the one remaining set relatively to the baffles, that the jets emanating from this set will not only serve to agitate and dislodge the soot, dirt, and other accumulations, but at the same time direct such dislodged material into the path of the current pursued by the combustion products, that is to say, the current produced by the draft.

The invention in detail may be described as follows:—

Referring to the drawings, S represents a boiler shell having terminal water-legs L, L, connected by circulating water-tubes T. Extending over the fire-box B, and above the bridge-wall W, and a suitable distance over the rear combustion chamber C, and disposed at the bottom of the water-tubes T, is a deflecting wall or horizontal baffle *a*, said baffle terminating so as to leave an opening or pass *o* between it and the rear water-leg as well understood in the art. Disposed at the top of the water-tube section, and extending from the rear water-leg forward a suitable distance (so as to leave a pass *o'* between it and the front water-leg) is a second baffle *b*. Leading from a steam supply pipe 1, in front of the front water-leg is a header 2 provided with a valve V, the free end of the header being closed. Leading from the header 2 are branches *t* to which are secured nozzles *n*,

said nozzles passing through a row of hollow stay-bolts *h* entering into the general construction of the water-leg. The plane of disposition of the header 2 is such as to bring the nozzles *n* opposite a horizontal row of stay-bolts contiguous to the zone of precipitation at the front of the baffle *a*, said zone being here designated by the reference character *r*. The horizontal row of stay-bolts selected is preferably the second above the plane of the bottom baffle, that, for the particular height of water-leg and the space between the baffles as shown, giving the best results. The vertical space between the baffles being comparatively narrow, the combustion products passing forwardly between the baffles are forced (by virtue of the draft pressure behind them) to make a rearward turn or return close to the bottom baffle as shown by the arrows in Fig. 1.

It is of course, well understood that a jet of steam issuing from an orifice will expand more or less; and advantage is taken of this expansion in positioning the nozzles *n*, the particular row of stay-bolts *h* selected being such that a portion of the jet force is utilized in dislodging and agitating the dirt in the zone *r*, another portion diverging and being responsive to the return bend of the current followed by the combustion products in passing over the front end of the upper baffle *b*. The nozzles *n* thus perform the double function of cleaners and agitators, and of blowers a portion of whose jet force is diverted to follow the general path of the draft. The shallower the boiler, that is to say, the closer the baffles *a* and *b* are brought together, the lower may the front nozzles *n* be placed, because the lower will be the point at which the front return of the gases will take place. The deeper the boiler, the higher up will be the point of front return of the gases, and after the height has passed say seven or eight tubes, a special row of front nozzles must be improvised at points above the center of the tube area to carry the products rearward over the front end of the top baffle. The latter arrangement is covered by the prior art, and from this my present improvement is thus distinguished.

In the rear of the boiler I provide a steam-supply pipe 1' from which leads a branch or header 2' the nozzles *n'* whereof discharge above the top baffle *b* behind (in front of) the rear water leg, and a branch 3 the nozzles *n''* whereof discharge below the baffle *b*, behind (in front of) the rear water-leg into the spaces between the tubes *T*. The several headers are provided with conventional control valves *V* well understood in the art. The action of the nozzles *n'*, *n''*, on the zones of precipitation *r'*, *r''*, are the same as in the prior patents above referred to, the nozzles *n''* serving both as blowers

and agitators, and assisting the general draft, while the nozzles *n'* are primarily mere agitators (tending to blow against the draft) dislodging and agitating the dirt in the region of the base of the stack *D*, the material being forced out by the current reinforced by the jets from the nozzles *n''* and *n*. Broadly speaking all the various nozzles are "blowers" but by way of distinction those which simply agitate and dislodge the dirt by jets directed against the general trend of the draft are termed agitators (nozzles *n'*), whereas those which dislodge the dirt and blow with the draft are termed blowers (nozzles *n''*). Under my present invention the nozzles *n* are so positioned in their relation to the planes of the baffles *a*, *b*, that they serve simultaneously both as agitators and blowers, thus performing a double function.

When the several nozzles are blown, the accumulated soot, ashes and solid materials are dislodged from the tubes *T*, shell *S*, (and water-legs *L*), and from the baffles *a* and *b*, and kept agitated so as to remain in suspension in the current produced by the furnace draft, such current taking the path from the fire-box substantially as indicated by the arrows (Fig. 1). The jets from the nozzles *n* will diverge so as to dislodge and agitate the material in the zone *r*, a portion of the jet force following the draft at the gas return just above the bend (marked *x*) and impelling the material rearwardly over the front end of the top baffle *b*. The branches *t* may be considered as forming part of the nozzles (*n*, *n'*, *n''*). The boiler furnace *F* may be said to be composed of the usual setting and including the parts *B*, *C*, *W*, and *D*, previously referred to.

Having described my invention what I claim is:—

1. In combination with a boiler furnace, a boiler having a water-tube section provided with horizontal baffles spaced vertically apart, means for causing the furnace draft to carry the gas in one direction in the space between the baffles, and suitable jet nozzles positioned at one end of said water-tube section between the planes of the baffles and operating partly against the draft to clean the accumulations above the bottom baffle at said end, and partly with the draft to divert the dislodged material in the opposite direction over the upper baffle.

2. In combination with a boiler having a shell and a water-tube section comprising a front and rear water-leg and connecting circulating tubes, a bottom horizontal baffle extending from the front water-leg to a point removed a suitable distance from the rear water-leg, a top horizontal baffle spaced vertically apart from the bottom baffle and extending from the rear water-leg to a point removed a suitable distance from the front

water-leg, blowing nozzles leading through the rear water-leg below the top baffle and discharging forward into the spaces between the tubes, nozzles discharging forward behind the rear water-leg into the space above the top baffle, and a set of jet nozzles, discharging rearward behind the front water-leg, disposed between the planes of the baffles, and positioned to partly blow against the draft to dislodge and agitate the accumulations at the front end of the bottom baffle and partly with the draft to divert the dislodged material into the current passing rearward over the front end of the top baffle.

3. In combination with a boiler having a shell and a water-tube section comprising a front and rear water-leg and connecting circulating tubes, a bottom horizontal baffle extending from the front water-leg to a point removed a suitable distance from the rear water-leg, a top horizontal baffle spaced vertically apart from the bottom baffle and extending from the rear water-leg to a point removed a suitable distance from the front water-leg, blowing nozzles leading through the rear water-leg below the top baffle and discharging forward into the spaces between the tubes, agitating nozzles leading through the rear water-leg into the space above the top baffle, and a set of nozzles leading

through the front water leg at points between the planes of the baffles and discharging rearwardly, and operating partly against the draft to dislodge and agitate the accumulations at the front portion of the bottom baffle, and partly with the draft to divert said dislodged material into the return bend of the current passing rearwardly over the front end of the top baffle.

4. In combination with a boiler having a shell, front and rear water-legs and connecting circulating tubes, top and bottom baffles between the water-legs terminating respectively at suitable distances from the front and rear water-legs, a furnace creating a draft forward between the baffles, and rearward above the top baffle, and a set of jet nozzles discharging rearward behind the front water-leg and operating partly against the draft to dislodge the soot and dirt from the front end of the bottom baffle, and partly with the draft to discharge into the return current passing rearward over the top baffle, whereby the material dislodged is drawn into said current.

In testimony whereof I affix my signature, in presence of two witnesses.

LEO JNO. BAYER.

Witnesses:

EMIL STAREK,

FANNIE E. WEBER.