June 9, 1931. N. L. SNOW ET AL 1,809,221

BOILER CLEANER

Filed Sept. 22, 1924 3 Sheets-Sheet 1

Fig. 1.

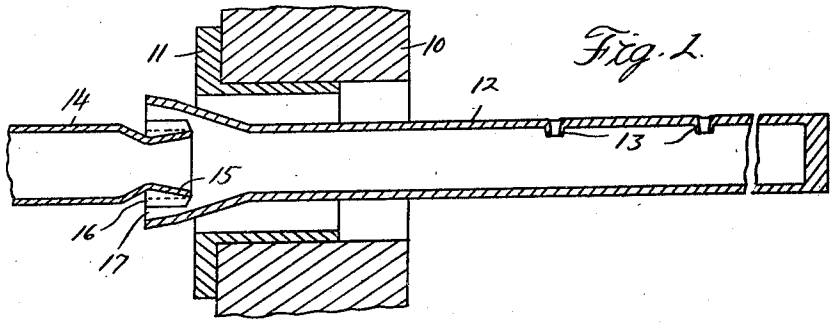

Fig. 2.

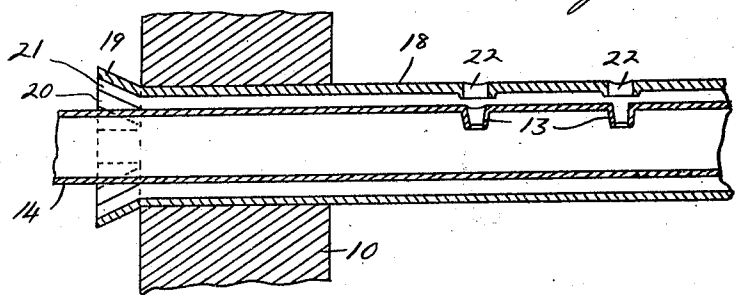

Fig. 3.

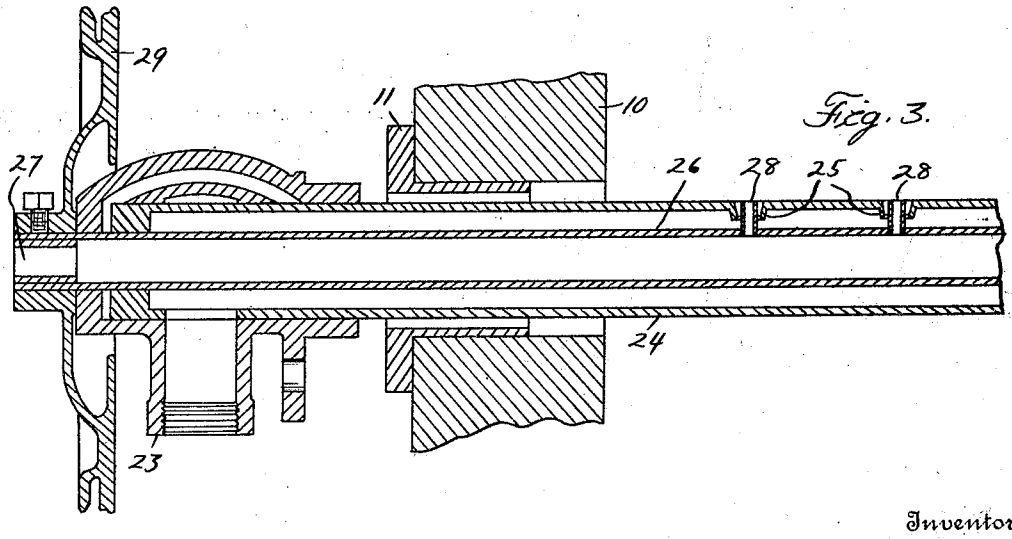

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Fig. 4.

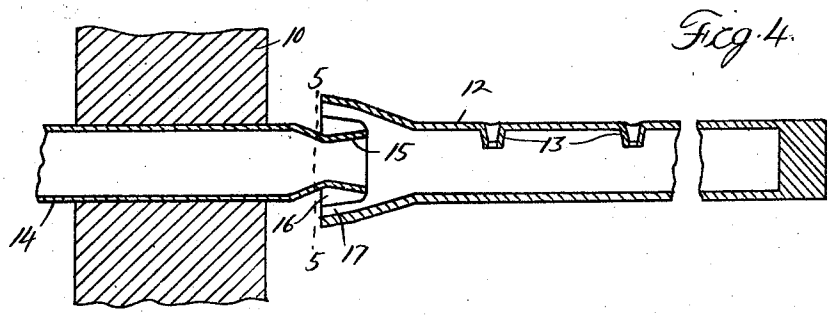


Fig. 6.

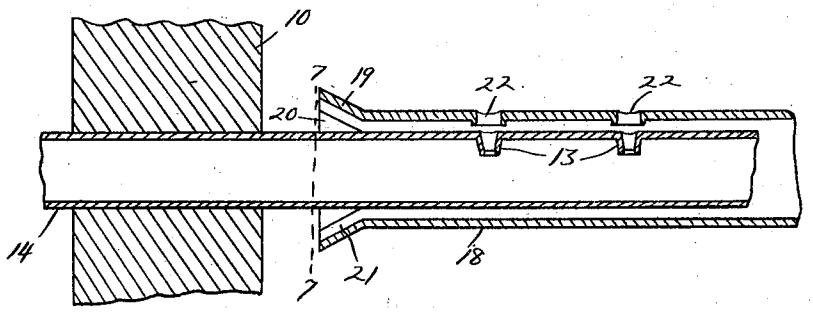


Fig. 5.

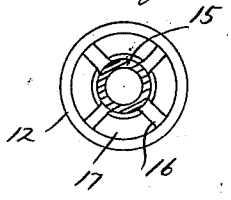
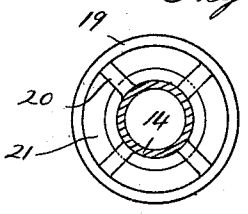


Fig. 7



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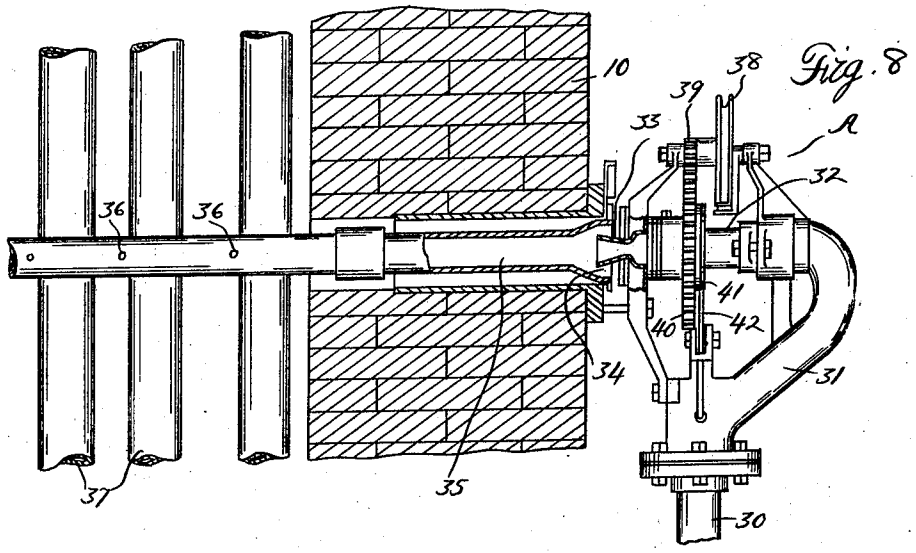

Fig. 8

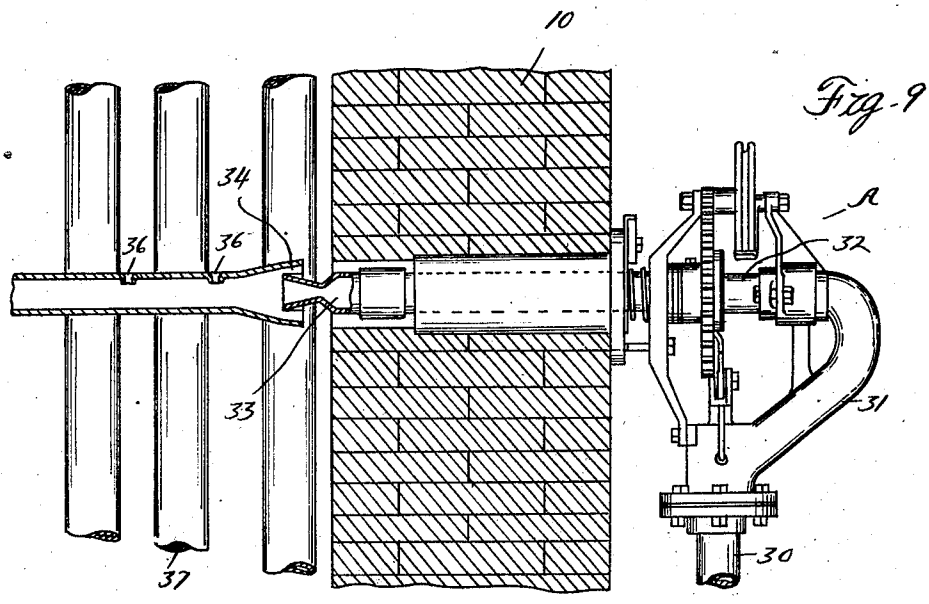

Fig. 9

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UNITED STATES PATENT OFFICE

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BOILER CLEANER

Application filed September 22, 1924. Serial No. 739,128.

The invention relates to boiler cleaners and has for its object to provide an improved method and apparatus for cleaning the tubes and other parts of boilers.

Referring to the drawings,

Figure 1 is a sectional view of a blower element projecting through the boiler setting, air from outside the boiler setting being injected into the blower;

Figure 2 is a sectional view showing a modification in which air outside the boiler setting is conducted to the blower nozzles, injection taking place at each nozzle;

Figure 3 is a sectional view showing a further modification in which air is conducted within the cleaning fluid pipe, injection taking place at each nozzle;

Figure 4 is a sectional view of a further modification in which furnace gases are injected into the blower;

Figure 5 is a view along the line 5—5 of Figure 4;

Figure 6 is a sectional view of a further modification in which furnace gases are conducted along the cleaning fluid supply pipe, injection taking place at each nozzle;

Figure 7 is a view along the line 7—7 of Figure 6;

Figure 8 is a view showing a blower of the type disclosed in Figure 1 applied to a valved blower head and;

Figure 9 is a view showing a modification in which furnace gases are injected into the blower.

Referring to Figure 1 reference character 10 indicates the boiler setting or wall having the wall box 11. Extending through the wall box is the blower pipe 12 having a plurality of nozzles 13 suitably located to direct the cleaning fluid against the boiler tubes and other parts of the boiler to be cleaned. The end of the blower pipe 12 extends outside the boiler setting wall box 11 and receives the end of the cleaning fluid supply pipe 14 which terminates in an injector nozzle 15. Ribs 16 support the nozzle 15 in its position and also permit passage of air through ports 17 formed between the ribs.

In operation steam or other cleaning fluid is supplied under pressure through the pipe 14, the injector nozzle 15 entraining air from outside of the boiler setting, the air being forced through ports 17 where it is mixed with the cleaning fluid discharged from the injector nozzle 15. The mixture is then conducted along blower pipe 12 and is discharged through the nozzles 13 to clean the parts of the boiler. The blower pipe is preferably rotated during the blowing operation in any suitable manner such as disclosed in Figures 3, 8 and 9.

In Figure 2 cleaning fluid such as steam is supplied through pipe 14. Surrounding this pipe and spaced therefrom is an air supply pipe 18 having a flared end 19 outside the boiler setting 10. Ribs 20 hold the pipes 18 and 14 in fixed relation, air passages 21 being provided between the ribs. The air supply pipe is provided with nozzles 22 axially aligned with nozzles 13.

In operation steam is supplied through the pipe 14 and is ejected through the nozzles 13 and 22, air from ports 21 being conducted along pipe 18 and ejected through nozzles 22 by the action of the steam escaping through the ejector nozzles 13. The mixture then impinges upon the surfaces to be cleaned.

Referring to Figure 3, cleaning fluid such as steam is supplied through the pipe 23 to the pipe 24 having the injector nozzles 25. Extending within and spaced from the steam pipe 24 is an air supply pipe 26 having an inlet 27 outside the boiler setting. The air pipe 26 is provided with a plurality of nozzles 28 axially aligned within the steam nozzles 25 and terminating adjacent the outlet of the steam nozzles whereby air will be entrained with the steam. A chain sheave 29 is preferably provided to permit rotation of the air and steam pipes during the blowing operation.

Referring to the modification disclosed in Figure 4, the cleaning fluid supply pipe 14 extends within the boiler setting 10. The nozzle 15 and the inlet ports 17 are therefore so located that the furnace gases will be ejected through the ports 17 and mixed with the cleaning fluid ejected from nozzle 15. The construction and operation otherwise corresponds with Figure 1.

Figure 6 likewise is provided with the cleaning fluid supply pipe 14 which extends within the boiler setting 10 whereby furnace gases are entrained in the system through ports 21 and discharged through nozzles 22 in a manner corresponding to the construction and operation described above in connection with the disclosure in Figure 2.

Referring to Figure 8, A represents a valved blower head, steam or other cleaning fluid being supplied through pipe 30, past a valve (not shown), through the goose-neck 31, and into pipe 32 where the steam escapes through the injector nozzle 33 where it entrains air through ports 34, the air passing from outside the boiler setting 10 through ports 34 where it enters the blower pipe 35. The mixture of air and steam is then conducted along the blower pipe 35 to the nozzles 36 where the mixture is ejected to clean the boiler tubes 37 and other parts of the boiler.

The blower head A comprises a chain sheave 38 for rotating pinion 39 meshing with gear 40. The gear 40 carries a cam 41 which engages valve stem 42 to unseat the valve (not shown) when the blower pipe is being operated. The blower pipe 35 is connected to rotate with the gear 40.

In operation chain sheave 38 is rotated to unseat the blower valve and rotate the blower pipe 35. Unseating the blower valve permits steam to pass from pipe 30 to head 31 and thence to injector nozzle 33. As the steam leaves the nozzle 33 air from outside the boiler setting 10 will be entrained and forced along blower pipe 35 where the mixture of air and steam will pass out of the nozzles 36 and impinge upon the parts of the boiler to be cleaned.

In the modification shown in Figure 9, the blower head A is constructed and operated similarly to that disclosed in Figure 8. In Figure 9 the steam pipe 32 extends through the boiler setting and terminates in an injector nozzle around which furnace gases are entrained as described in connection with the blower shown in Figure 4.

While it is preferred to use steam as a cleaning medium, other fluids such as air, etc., could be used.

What we claim as our invention is:—

1. In a boiler cleaner, a cleaning fluid supply pipe, a blower pipe, means for entraining a second fluid with the cleaning fluid and conveying the mixture to the blower pipe, said means including an extension on said blower pipe having a portion surrounding said supply pipe but spaced therefrom to provide a passage for the said second fluid around said supply pipe, and means for rotating said blower pipe and starting the flow of the cleaning fluid in timed relation.

2. In a boiler cleaner, a cleaning fluid supply pipe terminating outside the boiler setting in an injector nozzle, a blower pipe connected to said supply pipe and having an end surrounding the injector nozzle and spaced therefrom to provide air ports, said blower pipe having a plurality of cleaner nozzles and means for rotating said blower pipe and starting the flow of cleaning fluid in timed relation to entrain air with the cleaning fluid.

3. In a boiler cleaner, a cleaning fluid supply pipe having an injector nozzle positioned outside the boiler setting, the discharge of cleaning fluid from said nozzle acting to entrain air therewith, and means for conducting the mixture to a boiler cleaner nozzle, said means including a blower pipe having a flared end open to the outside of the boiler setting and adjacent said injector nozzle.

4. In a boiler cleaner, a cleaning fluid supply pipe having an injector nozzle positioned outside of the boiler setting, said injector nozzle being of Venturi form, the discharge of cleaning fluid from said nozzle acting to entrain air therewith, and means including a blower pipe terminating in an open end outside the boiler setting adjacent said injector nozzle for conducting the mixture to a boiler cleaner nozzle.

5. In a boiler cleaner, a cleaning fluid supply pipe having an injector nozzle, said nozzle being of Venturi form and provided with a throat of relatively small diameter, a nozzle pipe extending adjacent the parts of the boiler to be cleaned, a pipe provided with an enlarged open end connected to said nozzle pipe and extending adjacent the injector nozzle, said injector nozzle being so positioned as to discharge into said enlarged end of said second named pipe, the discharge of cleaning fluid from said injector nozzle acting to entrain a second fluid therewith, and means for conducting the mixture to a boiler cleaner nozzle.

6. A boiler cleaner including in combination, a blower pipe terminating in an enlarged end, a cleaning fluid supply pipe having an injector nozzle positioned to discharge cleaning fluid into the enlarged end of the said blower pipe, means for rotating the supply pipe, and means for transmitting the rotation of the said supply pipe to the said blower pipe.

7. A boiler cleaner including in combination, a blower pipe terminating in an enlarged end, a cleaning fluid supply pipe having an injector nozzle positioned to discharge cleaning fluid into the enlarged end of the said blower pipe, means for rotating the said supply pipe, means for controlling the flow of cleaning fluid to the supply pipe in dependence upon the rotation of the same, and means for transmitting the rotary movement of the supply pipe to the blower pipe whereby the discharge of cleaning fluid from the blower pipe will be in timed relation to the rotation of the same.

8. The combination with a boiler wall, a

rotatable blower element projecting through said wall, a supply pipe for discharging cleaning fluid into said blower element at a point exteriorly of said wall, means for rotating said blower element and supply pipe and means for controlling the supply of cleaning fluid to said blower element in dependence upon the rotation thereof, of means for entraining air with said cleaning fluid at the point of discharge of said supply pipe into said blower element for supplying a mixture of air and cleaning fluid to said blower element.

9. In a boiler cleaner, the combination with a boiler wall and a blower head mounted exteriorly of said wall and spaced from the same, of a pipe journaled in said head, a nozzle carried by said pipe, a blower element projecting through said boiler wall and having its inlet end arranged in axial alignment with said nozzle, ribs connecting the inlet end of said blower element to said nozzle providing passages for a second fluid into said blower element around said nozzle, and means for controlling the flow of cleaning fluid through said head to said pipe.

10. In a boiler cleaner, a rotatable blower pipe terminating in an enlarged end, a rotatable cleaning fluid supply pipe having a nozzle positioned to discharge cleaning fluid into the enlarged end of the blower pipe, means for rotating the said supply pipe, a valve controlling the flow of cleaning fluid through the said supply pipe, means for actuating said valve in dependence upon the rotation of said supply pipe, and ribs rigidly connecting the said nozzle to the enlarged end of the blower pipe whereby the blower pipe rotates with the said supply pipe, said ribs providing passages for a second fluid around said nozzle and communicating with said blower pipe whereby the said second fluid is entrained with the first-mentioned cleaning fluid in its passage from the said supply pipe to the blower pipe.

11. In a boiler cleaner, a blower head, a cleaning fluid supply pipe journaled in said head, a nozzle formed on the outlet end of said supply pipe, a valve for controlling the flow of cleaning fluid through said supply pipe, means for rotating said supply pipe, means for actuating said valve upon rotation of said supply pipe, a blower pipe having an enlarged end surrounding the nozzle on said supply pipe in spaced relation to the same for receiving cleaning fluid therefrom, and ribs rigidly connecting the enlarged end of the blower pipe to the said nozzle.

12. In a boiler cleaner, a rotatable blower pipe terminating outside of the boiler setting in an enlarged end, a cleaning fluid supply pipe terminating in an injector nozzle arranged within the enlarged end of the blower pipe, ribs connecting the enlarged end of the blower pipe to the said injector nozzle, said ribs being arranged to support the injector nozzle within the enlarged end of the blower pipe while permitting the passage of air around the injector nozzle into the blower pipe for entrainment with the cleaning fluid, and means for rotating said supply pipe and said blower pipe as a unit.

13. In a boiler cleaner, the combination with a boiler wall and a blower head arranged exteriorly of said wall, of a cleaning fluid supply pipe journaled in said head, said cleaning fluid supply pipe terminating in an injector nozzle, a blower pipe projecting through the boiler wall and having an enlarged end arranged exteriorly of said wall for receiving said injector nozzle, means for rotating said supply pipe, means for controlling the flow of cleaning fluid through said supply pipe in dependence upon the rotation thereof, and ribs connecting the enlarged end of the blower pipe to said injector nozzle whereby said blower pipe rotates with the said supply pipe, said ribs being arranged to support the injector nozzle within the enlarged end of the blower pipe while permitting the passage of air around the injector nozzle into the blower pipe for entrainment with the cleaning fluid.

14. In a boiler cleaner, the combination with a boiler wall and a blower head arranged exteriorly of said wall, of a cleaning fluid supply pipe journaled in said head, said cleaning fluid supply pipe terminating in an injector nozzle of Venturi form, a blower pipe projecting through the boiler wall and having an enlarged end arranged exteriorly of the boiler wall for receiving said injector nozzle, a gear fixed to said supply pipe for rotating the same, a valve for controlling the flow of cleaning fluid through said supply pipe, a cam fixed to said gear for actuating said valve upon rotation of said supply pipe, and ribs connecting the enlarged end of said blower pipe to said injector nozzle whereby said blower pipe rotates with said supply pipe, said ribs being arranged to support the injector nozzle within the enlarged end of the blower pipe while permitting the passage of air around the injector nozzle into the blower pipe for entrainment with the cleaning fluid.

15. In a boiler cleaner, a cleaning fluid supply pipe, a blower pipe provided with a discharge nozzle, means for entraining a second fluid with the cleaning fluid adjacent the discharge nozzle for discharge with the cleaning fluid adjacent the portion of the boiler to be cleaned, means for rotating the blower pipe, and means for controlling the flow of cleaning fluid to the blower pipe in timed relation to the rotation thereof.

16. In a boiler cleaner, a cleaning fluid supply pipe, a blower pipe arranged to receive cleaning fluid from said supply pipe and provided with a plurality of discharge

nozzles, means for conducting a second cleaning fluid to adjacent said nozzles, means for entraining the second fluid with the cleaning fluid at each of said nozzles for discharge with the cleaning fluid adjacent the portions of the boiler to be cleaned, means for rotating the blower pipe, and means for controlling the flow of cleaning fluid to the blower pipe in timed relation to the rotation thereof.

17. In a boiler cleaner, a blower element having a plurality of nozzles spaced throughout its length for discharging cleaning fluid adjacent portions of a boiler to be cleaned, and means for conducting to adjacent each of said nozzles a second cleaning fluid, the arrangement being such that the second cleaning fluid is entrained with the first mentioned cleaning fluid at each of said nozzles upon discharge of the first mentioned cleaning fluid through the said nozzles.

In testimony whereof we affix our signatures.

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CLARENCE F. HIRSHFELD.