Sept. 26, 1933. F. BOWERS 1,928,090

BOILER CLEANER

Filed July 23, 1930 2 Sheets-Sheet 1

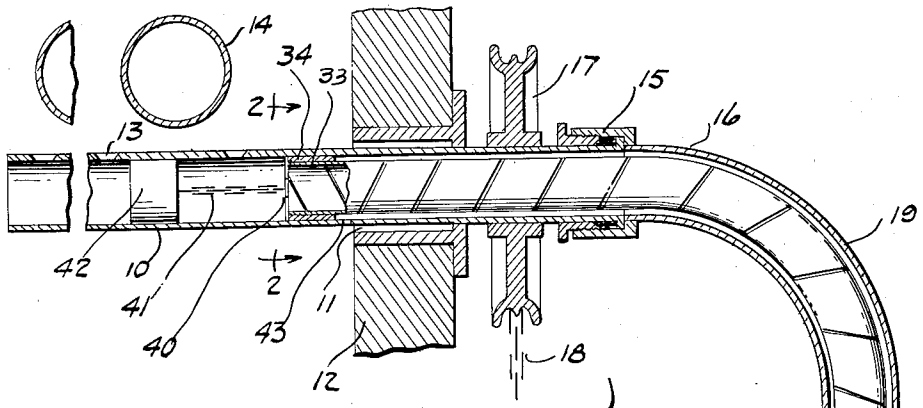


Fig. 1.

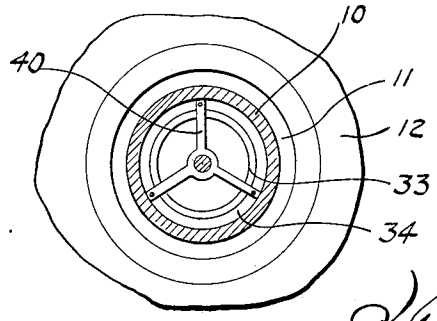


Fig. 4.

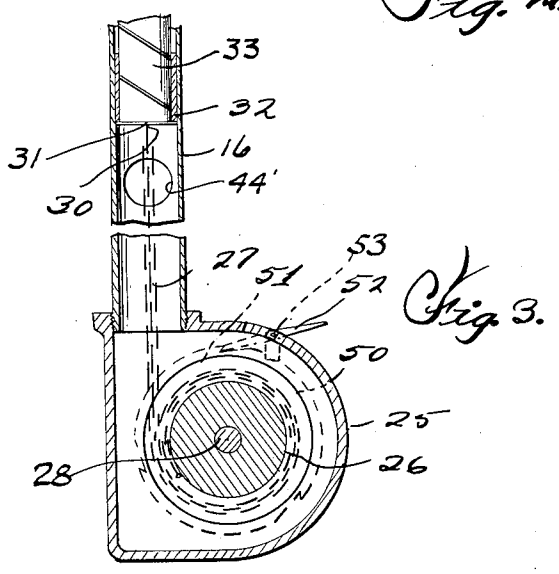
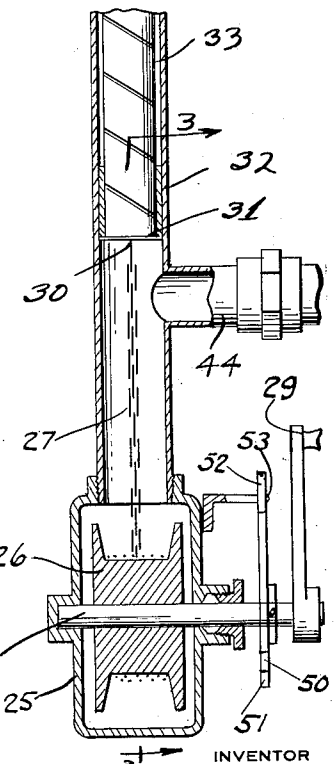


Fig. 3.



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Sept. 26, 1933. F. BOWERS 1,928,090

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Filed July 23, 1930 2 Sheets-Sheet 2

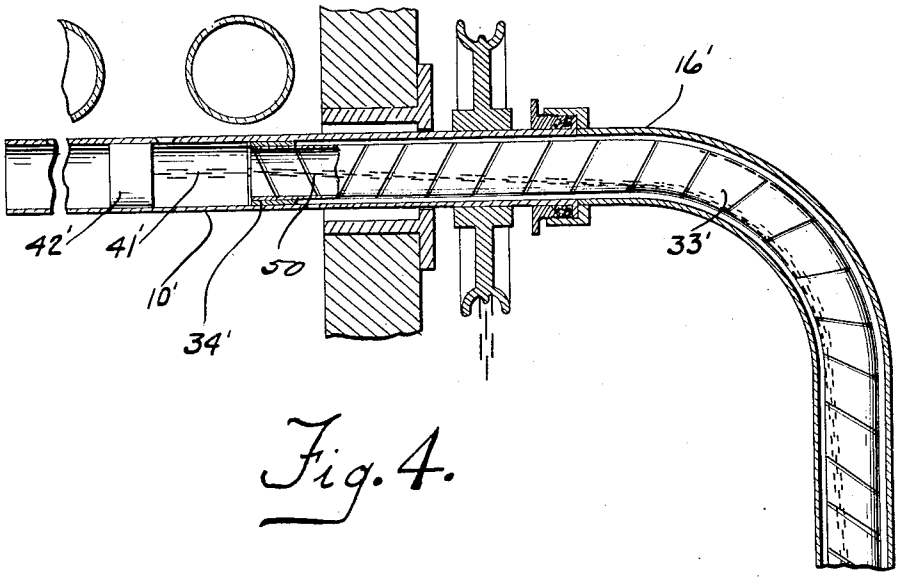


Fig. 4.

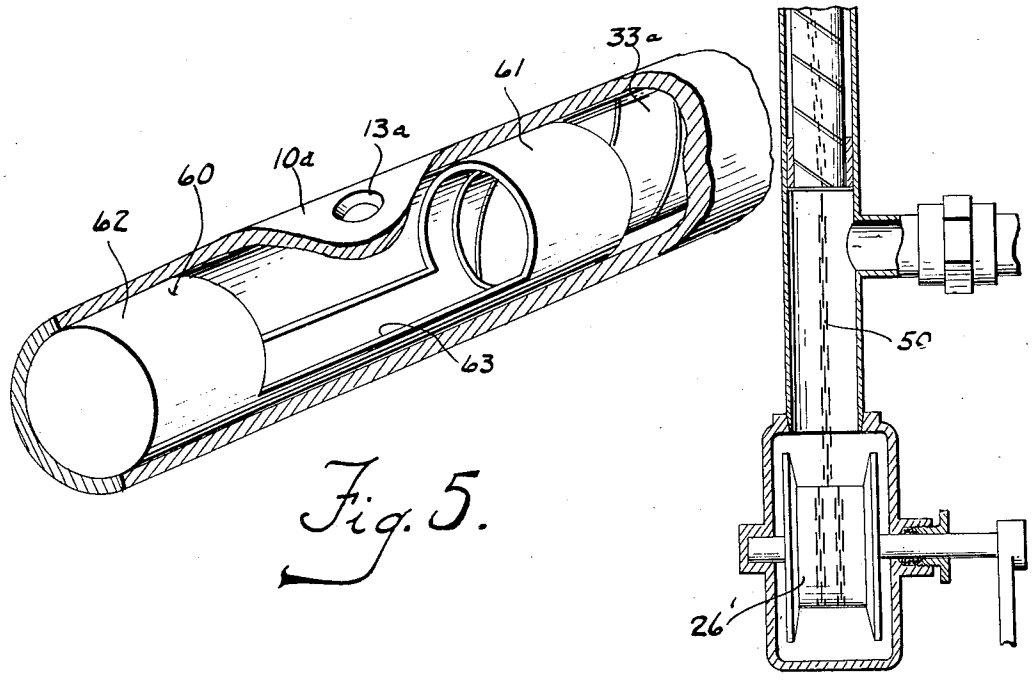


Fig. 5.

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UNITED STATES PATENT OFFICE

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BOILER CLEANER

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Application July 23, 1930. Serial No. 470,087

10 Claims. (Cl. 122—392)

This invention relates to boiler cleaners and has particular reference to a boiler cleaner of the character in which a blower element is provided with a plurality of discharge openings for directing jets of cleaning fluid adjacent portions of the boiler to be cleaned.

One of the primary objects of this invention is to provide means whereby cleaning fluid will be supplied to only a limited number of the discharge openings in said blower element at any one time so that the cleaning fluid will be discharged in the form of one or more powerful jets.

The invention further contemplates the provision of means for discharging cleaning fluid into the blower element at any one of a plurality of points and the provision of means for varying the point of discharge of cleaning fluid into the blower element to vary the location of the jet of cleaning fluid discharged from the blower element.

Other objects and advantages of this invention, together with the numerous novel details of construction thereof, will become more apparent as the following description proceeds, particularly when reference is had to the accompanying drawings, wherein:

Figure 1 is a semi-diagrammatic sectional view through a boiler cleaner constructed in accordance with the teachings of this invention and showing the same in position in a boiler;

Figure 2 is a sectional view taken substantially on the line 2—2 of Figure 1;

Figure 3 is a sectional view taken substantially on the line 3—3 of Figure 1;

Figure 4 is a view similar to Figure 1 showing a slightly modified form of construction; and

Figure 5 is a fragmentary perspective view with parts broken away of a still further modified form of construction.

Referring then particularly to the drawings wherein like reference characters designate corresponding parts throughout all views, the numeral 10 designates a blower element which extends through an opening 11 in the boiler wall 12 and which is provided with suitably spaced discharge openings 13 for directing jets of cleaning fluid adjacent the portions of the boiler to be cleaned, such, for example, as the boiler tubes 14. The blower element is preferably rotatably mounted at its outer end in a stuffing box 15 carried by the end of a tube 16 and a wheel 17, fixed to the blower element and adapted to be rotated either by hand or by a flexible chain 18, provides means for rotating the blower element to direct the jets of cleaning fluid discharged from the same adjacent the portions of the boiler to be cleaned.

The distal or inner end of the blower element may, as illustrated, be open, while the other end thereof communicates with the tube 16 which, as illustrated, is preferably gradually curved as at 19 and extends adjacent the boiler wall for a distance equal to the length of the blower element. The tube 16 terminates at its lower end in a casing 25 which is preferably steam tight to prevent the escape of cleaning fluid. Rotatably mounted in the casing 25 is a drum 26, and wound on this drum is a flexible member such as the chain 27. A shaft 28 provided with a crank handle 29 provides means for rotating the drum to wind the chain thereon.

The free end of the chain is connected as at 30 to a spider 31 formed on the end of a piston 32, which is carried by the end of a flexible metal tube 33. This flexible metal tube extends through the tube 16 and is provided on its other end with a piston 34 which fits within the blower element 10. The pistons 32 and 34 are shown as being formed by fixing sleeve-like members on the ends of the flexible tube 33, but it is to be clearly understood that these pistons may be formed in any desired manner as long as they engage the inner peripheries of the tube 16 and blower element 10, respectively.

The piston 34 is provided with a spider 40 to which is connected one end of a chain 41, the other end of this chain being connected to a piston 42 within the blower element. An opening 43 is formed in the blower element to vent the space between the pistons 32 and 34, while a cleaning fluid supply pipe 44 provides means for supplying cleaning fluid to the tube 16 at a point slightly above the casing 25.

The pistons 32 and 34 may be conveniently described as sleeve pistons in that they merely close the space between the flexible tube 33 and the tube 19 or blower element 10 while permitting the flow of cleaning fluid from the inlet 44 through the flexible tube to the blower element. The piston 42, on the other hand, is a solid piston which prevents the flow of cleaning fluid longitudinally of the blower element and thus limits the supply of cleaning fluid in the blower element to the area between pistons 34 and 42. It will be understood, however, that all of the pistons 32, 34 and 42 fit rather loosely within the tube 19 and blower element 10 so that they may move longitudinally of the tube and the blower element.

For checking longitudinal movement of the flexible tube 33, there may be provided a ratchet wheel 50 having the ratchet teeth 51. This ratchet wheel may be fixed to the shaft 28 exteriorly of the casing 25 and a pawl 52 pivoted as at 53 on the casing 25 is arranged for engagement with the ratchet teeth to periodically check rotation of the drum. The ratchet teeth are so spaced circumferentially of the ratchet wheel that the movement of the tube 33 will be checked

periodically each time the pistons 34 and 42 are located on each side of a discharge nozzle. Thus these pistons will be periodically checked in their movement and will be positioned on opposite sides of the discharge openings successively throughout the length of the blower element so that cleaning fluid will be supplied successively to the discharge openings.

The operation of the device as above described is as follows. Cleaning fluid such as steam under pressure is supplied to the tube 16 from the pipe 44. This cleaning fluid acts on the piston 32 and flows through the tube 33 to act on the piston 42, thus tending to urge the tube 33 out of the tube 16. The gradual curve in the tube 16 permits this longitudinal travel of the tube 33 and the chain 27 and drum 26 provide means for controlling and limiting the longitudinal travel of the tube 33.

The travel of the tube 33 will be periodically checked by the pawl and ratchet mechanism so that the pistons 34 and 42 will be positioned on opposite sides of one discharge opening 13 in the blower element at a time so that the cleaning fluid which passes through the tube 33 will be supplied to only one discharge opening at a time. Obviously, after cleaning fluid has been supplied to one discharge opening for a desired length of time, the pawl may be momentarily released to permit a further advance of the tube 33 and associated structure under the pressure of the cleaning fluid. When the pistons 34 and 42 have moved to a position on opposite sides of the next discharge opening, the pawl 52 will engage the next ratchet tooth to again check the movement of these pistons. Obviously, after all of the discharge openings have been successively supplied with cleaning fluid and the tube 33 has been projected to the limits of its movement, the supply of cleaning fluid may be cut off and the tube 33 may be returned to its original position by a proper actuation of the crank 29 and drum 26, the pawl riding over the ratchet teeth during this return movement.

From the above it will be apparent that the invention provides means for discharging cleaning fluid into a blower element at any one of a plurality of spaced points and provides means for limiting the supply of cleaning fluid to the blower element to a small area adjacent the nozzle to which cleaning fluid is to be supplied. The pistons 34 and 42 restrict the flow of cleaning fluid within the blower element so that the cleaning fluid will be discharged only through the discharge opening in the blower element adjacent which it is discharged from the tube 33, with the result that all of the pressure of the cleaning fluid will be concentrated in a single powerful jet. It will be obvious that, if desired, the chain 41 may be lengthened to increase the space between the pistons 34 and 42 so that more than one discharge opening will be supplied with cleaning fluid at a time.

In Figure 4 a slightly modified form of construction is shown. By reference to this figure of the drawings it will be noted that, as in the first described form of construction, the blower element 10′ is rotatably journaled in the end of tube 16′ and that cleaning fluid is supplied to the blower element by a flexible tube 33′ mounted within the tube 16′. In this form of construction, however, there is provided a chain 50 which is substituted for the chain 27 and which extends entirely through the tube 33′ for connection to the end of the chain 41′ which connects the piston 34′ to the piston 42′. Thus, in this form of construction no strain will be placed upon the flexible tube 33′ upon actuation of the drum 26′ to return the tube 33′ to its original position.

In Figure 5 a further modification of the inventive idea is disclosed and by reference to this figure it will be noted that there is provided a member 60 adapted to be fixed to the inner end of the flexible tube 33*a*. The member 60 is provided with a tubular end portion 61 which surrounds the end of the tube 33*a* and which is adapted to take the place of the piston 34 disclosed in the first described form of invention. Spaced from the portion 61 of the member 60 is a solid cylindrical portion 62 which constitutes the equivalent of the piston 42 in the first described form of construction. Connecting the portions 61 and 62 is an arcuate plate-like member 63 which in substance constitutes the equivalent of the chain 41 in that it provides means for transmitting movement from the portion 61 of the member 60 to the portion 62 thereof.

When the member 60 is substituted for the piston 34, chain 41 and piston 42 of the first described form of invention the operation will be substantially the same as above outlined in that cleaning fluid discharged from the end of the flexible tube 33*a* will be restricted in its flow longitudinally of the blower element 10*a* and thus will be discharged through the discharge opening 13*a*. In this form of construction, however, the portion 63 of the member will also constitute a valve member which will limit discharge of the cleaning fluid through the opening 13*a* to a predetermined portion of the rotative movement of the blower element. Thus, upon rotation of the blower element the port 13*a* will be periodically closed by the portion 63 of the member 60 and cleaning fluid will be discharged from the discharge opening for a predetermined portion only of its rotative movement. It will be obvious that the length of the arc of discharge of cleaning fluid may be regulated by varying the width of plate 63 so that the structure may be designed to permit a discharge of cleaning fluid through any desired arc depending upon the arrangement and location of parts of the boiler to be cleaned. The member 60 will fit sufficiently loosely within the blower element to provide for movement of this member longitudinally of the blower element and to also provide for rotation of the blower element relative to this member.

In each form of the invention, it will be noted that there is provided a blower element which is provided with discharge openings and which is rotatable, so that cleaning fluid discharged from the openings may be directed toward the parts of the boiler to be cleaned. Cleaning fluid may be discharged into the blower element at any one of a plurality of spaced points so that the cleaning fluid will be discharged from the blower element in the form of one or more powerful jets. Obviously, at any position of the tube 33 within the blower element or within the tube 16 the blower element may be rotated by a suitable actuation of the wheel 17.

For the sake of convenience the invention has been described as being incorporated in a boiler cleaner for cleaning parts of a boiler or the like. It will be apparent, however, that the inventive principles disclosed might be incorporated in a cleaning device for cleaning any similar type of construction, and it is therefore to be understood that the term "boiler" wherever used in the speci-

fication or claims is to be construed as meaning a heat transfer apparatus or fluid heater of any character, while the term "boiler cleaner" is to be construed as meaning a cleaner for any such apparatus.

While the invention has been described with considerable detail, it is to be understood that the description is for the purposes of illustration only and is not definitive of the limits of the inventive idea. The right is therefore reserved to make such changes in the details of construction and arrangement of parts as will fall within the purview of the attached claims.

What I claim as my invention is:

1. In a boiler cleaner, a rotatable blower element provided with a plurality of spaced discharge openings, means for discharging a cleaning fluid into said blower element at one only of a plurality of spaced points at a time and adjacent one of said openings at a time while preventing passage of the cleaning fluid within the blower element to the remaining openings to effect a discharge of cleaning fluid through one of said openings at a time, and means for rotating said blower element.

2. In a boiler cleaner, a rotatable blower element having a plurality of discharge openings, a cleaning fluid supply tube having its discharge end within said blower element, and means for moving said cleaning fluid supply tube to locate the discharge end thereof adjacent one of said openings at a time.

3. In a boiler cleaner, a blower element provided with a plurality of discharge openings, a cleaning fluid supply tube having its discharge end arranged within said blower element, means for moving said supply tube to locate the discharge end thereof adjacent one of said openings at a time, and means associated with said supply tube to limit the flow of the cleaning fluid within the blower element to compel discharge of the cleaning fluid through the opening adjacent which the end of said supply tube is located.

4. In a boiler cleaner, a rotatable blower element provided with a plurality of discharge openings, a cleaning fluid supply tube having its discharge end located within said blower element, means acted upon by the cleaning fluid to move the said supply tube and the discharge end thereof relative to the discharge openings in the blower element, and means for checking the movement of the said supply tube to locate the discharge end thereof adjacent one of said openings at a time according to a predetermined desired sequence.

5. In a boiler cleaner, a blower element provided with a plurality of discharge openings spaced throughout its length, a cleaning fluid supply tube having its discharge end located within the said blower element, means acted upon by the cleaning fluid for moving the supply tube longitudinally of the said blower element, a flexible member connected to said supply tube, and means associated with said flexible member for checking the movement of said supply tube to locate the discharge end thereof adjacent one of said openings at a time according to a predetermined desired sequence.

6. In a boiler cleaner, a blower element provided with a plurality of discharge openings spaced throughout its length, a cleaning fluid supply tube having its discharge end located within the said blower element, a piston formed on said supply tube adjacent the discharge end thereof, a second piston within said blower element and flexibly connected to said first mentioned piston, said pistons cooperating to restrict flowing of the cleaning fluid discharged into said blower element from said supply tube to cause this cleaning fluid to be discharged from one of the discharge openings in said blower element at a time.

7. In a boiler cleaner, a blower element provided with a plurality of discharge openings spaced throughout its length, a flexible cleaning fluid supply tube having its discharge end located within the said blower element, means acted upon by the cleaning fluid for moving the said cleaning fluid supply tube longitudinally of the blower element, means for checking the movement of said supply tube to locate the discharge end thereof of successively adjacent said discharge openings, a piston formed on the end of said supply tube within the said blower element, a second piston located within said blower element, and means flexibly connecting said pistons, said pistons cooperating to limit the flow of cleaning fluid within the blower element to compel discharge of the same through that opening adjacent which the discharge end of the supply tube is located.

8. In a boiler cleaner, a blower element provided with a plurality of spaced discharge openings, means for discharging a cleaning fluid into said blower element at one only of a plurality of spaced points at a time and adjacent one of said openings at a time while preventing passage of the cleaning fluid within the blower element to the remaining openings to effect a discharge of cleaning fluid through one of said openings at a time, means for rotating said blower element, and means for limiting the discharge of cleaning fluid through said discharge opening to a portion of the rotative movement of the blower element.

9. In a boiler cleaner, a rotatable blower element provided with a plurality of discharge openings, a cleaning fluid supply tube having its discharge end arranged within said blower element, means for moving said supply tube to locate the discharge end thereof adjacent one of said openings at a time, means associated with said supply tube to limit the flow of the cleaning fluid within the blower element and to compel discharge of the cleaning fluid through the opening adjacent which the end of said supply tube is located, and means for limiting discharge of cleaning fluid through said opening to a portion of the rotative movement of the blower element.

10. In a boiler cleaner, a rotatable blower element provided with a plurality of discharge openings spaced throughout its length, a cleaning fluid supply tube having its discharge end located within the said blower element, a piston formed on said supply tube adjacent the discharge end thereof, a second piston within said blower element and spaced from the first mentioned piston, said pistons cooperating to restrict flow of the cleaning fluid discharged into said blower element to cause this cleaning fluid to be discharged from one of the discharge openings in said blower element at a time, and a valve member connecting said pistons for closing said discharge opening during a portion of the rotative movement of said blower element.

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