

July 15, 1941.

F. BOWERS

2,248,947

SOOT BLOWER

Filed March 25, 1938

2 Sheets-Sheet 1

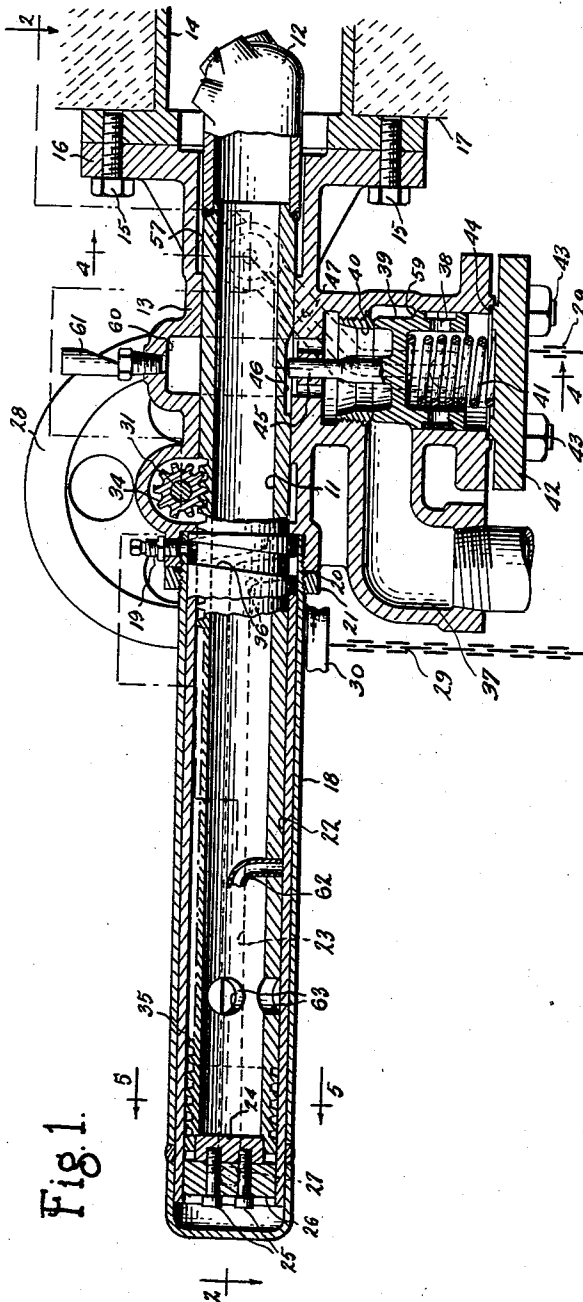


Fig. 1.

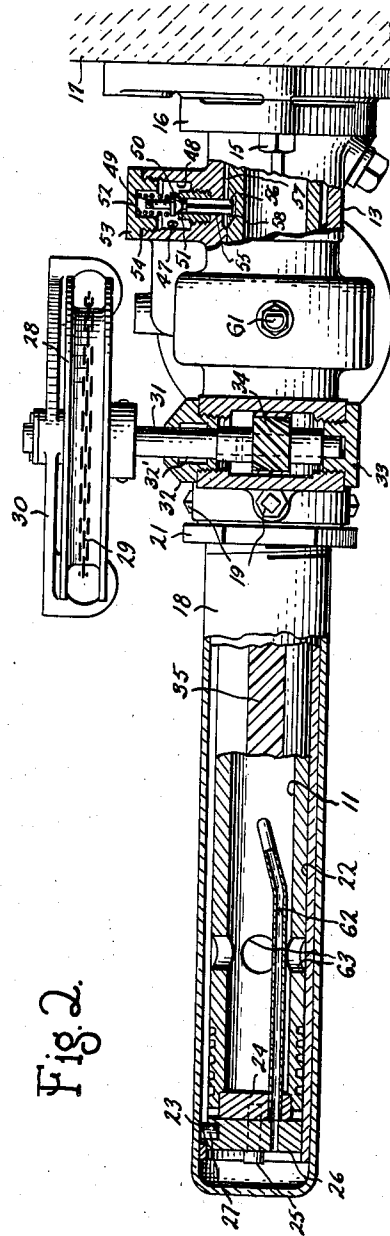


Fig. 2.

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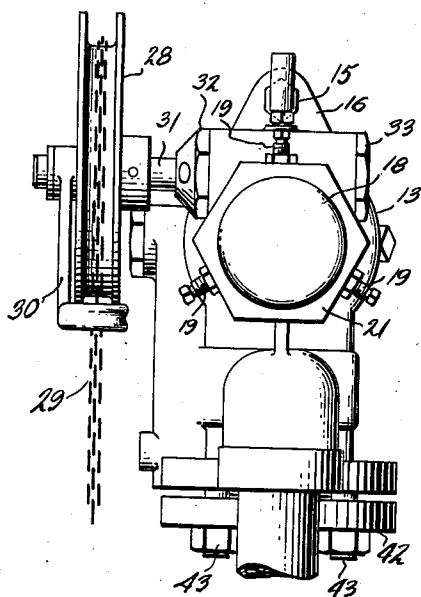


Fig. 3.

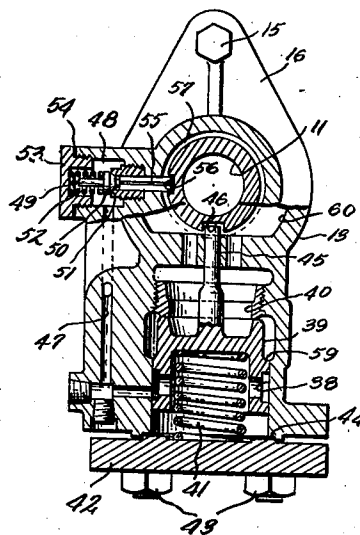


Fig. 4.

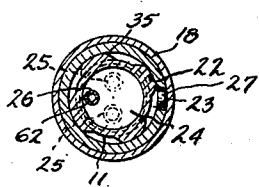


Fig. 5.

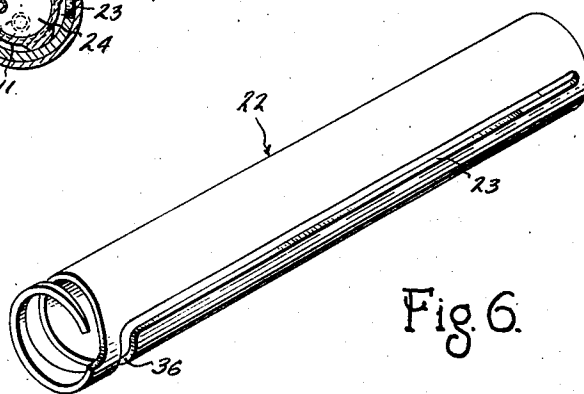


Fig. 6.

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UNITED STATES PATENT OFFICE

2,248,947

SOOT BLOWER

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Application March 25, 1938, Serial No. 198,099

1 Claim. (Cl. 122—392)

This invention relates to a boiler cleaning apparatus of the fluid blast type and particularly to the class having a blower nozzle that moves into the boiler to project a stream of cleaning fluid against that portion of the boiler to be cleaned and is withdrawn from the path of the boiler gases when not in operation.

Many boiler cleaning devices of this general character have proved unsatisfactory in operation because cleaning fluid is supplied to the nozzle at the time the nozzle starts its movement into the boiler. This results in an expensive waste of cleaning fluid and frequently severe damage to parts of the boiler contacted by the cleaning fluid as the nozzle moves into the proper blowing position. It is an object of the present invention to avoid these shortcomings by providing a boiler cleaning apparatus wherein the nozzle is placed in the proper blowing position before cleaning fluid is admitted to it.

A second feature of the invention is the provision of means to prevent movement of the blower nozzle into the boiler unless the valve admitting cleaning fluid to the apparatus is in the open position.

The invention further discloses new and improved means for projecting the blower nozzle to the desired blowing position and then rotating it about its longitudinal axis.

Other objects and features of the invention will become apparent as the description proceeds particularly when reference is made to the accompanying drawings wherein like reference characters indicate like parts in the several views and wherein:

Figure 1 is a semi-diagrammatic vertical sectional view of my invention,

Figure 2 is an upper plan view partially broken away on the line 2—2 of Figure 1,

Figure 3 is a rear elevation,

Figure 4 is a front elevation,

Figure 5 is a vertical sectional view of the tube structure taken on the line 5—5 of Figure 1, and Figure 6 is a view in perspective of the guide tube.

Referring first to Fig. 1 of the drawings, 11 denotes a rack tube fitted at one end with a blower nozzle 12 of any desired construction. The tube 11 is mounted in a head 13 which is intimately secured to wall box 14 as by screws 15 passing through the flanged end 16 of the head 13. It will be understood that the wall box 14 is set in the furnace wall 17 in the usual manner. Threadably inserted in the head 13 is tube casing 18 which is further secured to the head 13

by studs 19. Packing 20 and the associated packing nut 21 are employed to make a fluid-tight connection. A guide tube 22 which carries keyway 23 is immovably connected to the tube casing 18 preferably by welding. The end of the rack tube 11 opposite the nozzle 12 is closed by an end plug 24 welded therein. Attached to the end plug 24 as by screws 25 is end plate 26. A pin or key 27 carried by the end plate 26 is fitted to the keyway 23 in such a manner that it may travel longitudinally therein.

A sheave wheel 28 is provided for projecting the blower into the boiler and for subsequently withdrawing it to its idle position. Associated with the sheave wheel 28 is chain 29 and chain guide 30. The sheave wheel 28 is fixedly engaged to one end of a pinion shaft 31 which is journaled in suitable bushings 32 and 33, as shown in Figs. 2 and 3, in the head 13. Bushing 32 carries packing 32^a to prevent the escape of cleaning fluid from the head 13. Also rigidly mounted on pinion shaft 31 is pinion 34 which is arranged to engage the gear teeth 35 of rack tube 11. The teeth on the pinion 34 and the gear teeth 35 are cut on a 45° spiral, and at the end of the rack tube 11 opposite the nozzle 12 the teeth continue completely around the periphery.

Thus, with the blower in its idle position, as viewed in Fig. 1, counter-clockwise rotation of the sheave wheel 28 by actuation of the right hand chainfall, results in rotation of pinion 34 by the connecting pinion shaft 31. At the start of its travel key 27 riding in keyway 23 prevents the blower tube 11 from rotating about its longitudinal axis so that the action of the pinion 34 on the gear teeth of the tube 11 results in the rack tube 11 travelling linearly outward from the head 13 until the key 27 reaches the circumferential portion 36 of the keyway 23 whereupon the rack tube 11 is permitted to revolve about its longitudinal axis in an arc which is determined by the length of the circumferential portion 36 of the keyway 23. Since the slot 36 is inclined the tube 11 and hence the nozzle 12 will be projected further as the tube 11 revolves about its longitudinal axis and when the key 27 reaches the end of the keyway 23, 36 the device is positively stopped against further movement in the outward or projecting direction. To retract the blower to its idle position, movement of the sheave wheel 28 is reversed by pulling on the left hand chainfall and the above described process is reversed.

While the invention is described, for convenience sake, as being manually operated, it will

be apparent that the device could be readily adapted to power driven means without alteration of any essential parts.

The head 13 is provided with a branch 37 through which cleaning fluid is supplied. Adjacent to the branch 37 is disposed a cylinder 38 in which valve piston 39 is loosely fitted and arranged to seat on the fitting 40. A spring 41 tends to hold piston 39 to its seat. Supporting the spring 41 and closing the end of the cylinder 38 is the flanged plate 42. Studs 43 hold the plate 42 to the head 13 in a relation that is made fluid-tight by the gasket 44. Projecting upwardly from the valve piston 39 and forming a part thereof is rod 45 which when the valve piston 39 is seated extends into a slot 46 cut out of the wall of the rack tube 11. The arrangement is such that the rack tube 11 cannot be extended into the boiler unless the rod 45 has been withdrawn from the recess 46, and this is true only if the valve 39 is open.

Opening into the cylinder 38 below the piston 39 is a line 47 through which the pressure built up by the fluid permitted to leak past the valve piston 39 is discharged. The line 47 terminates in a valve chamber 48 (see Fig. 2) in which a pilot valve 49 is located. This pilot valve 49 comprises a valve member 50 which is held to its seat 51 by a spring 52 under compression. Fitting 53 and gasket 54 close and seal the end of the valve chamber, the fitting 53 further providing support for the spring 52. Valve stem 55 fixed to the valve member 50 normally projects into a recess 56 in the blower tube 11. The free end of the valve stem 55 and the cam-shaped edge 58 of the recess 56 are shaped so that projection of the blower tube 11 will actuate valve stem 55 thus opening the valve 49 and exhausting the pressure in valve chamber 48 into the wall box 14 through the passage 57.

In operation with the parts position as in Fig. 1 shaft 31 is rotated by pulling the chain 29 as previously described. This causes the pinion 34 to act on the teeth of the rack tube 11 and start it on its outward travel. As the tube 11 moves, the cam edge 58 depresses valve stem 55 and opens pilot valve 49 exhausting the pressure in chamber 48, line 47, and below the piston 39. It will be apparent that as the tube 11 moves outward from the head 13 it will hold the pilot valve 49 open until the tube 11 is returned to the position where the valve stem 55 is opposite the recess 56. The parts are so proportioned that the spring 41 alone is not able to resist the force of the fluid on the shoulder 59 of the valve piston 39 which is thus moved to its open position permitting the cleaning fluid to flow from branch 37 to the annular chamber 60. The presence of fluid under pressure in the annular chamber 60 actuates the whistle 61 and gives the operator an audible indication of when the valve 39 is open. Should the valve 39 fail to open, the tube 11 can only move outward until the end of slot 46 abuts against the rod 45 whereupon the device is held against further movement in the outward direction.

In order to maintain a balanced pressure on both sides of the end plate 26 a by-pass tube 62 is provided in the rack tube 11. It is so designed that it passes through the end plate 26 and opens into the space formed by the closed end of tube

casing 18 and the end plate 26. The opposite end of the by-pass tube 62 opens through the wall of the rack tube 11 at any convenient point intermediate the ports 63 and the nozzle 12 but preferably near the ports 63. The arrangement is such that the fluid leakage around the rack tube 11 is carried back of the end plate 26 thus tending to equalize the pressure on the end plate. Further, when the blower is retracted from its fully extended position the by-pass 62 serves to exhaust any pressure that may be built up in the tube casing 18. As the rack tube 11 and nozzle 12 are projected the end of the by-pass tube 62 is exposed to the full fluid pressure in annular chamber 60 and carried back of the end plate 26, upon further movement the ports 63 enter the chamber 60 and fluid under pressure is supplied to the nozzle 12. At the same time that the ports 63 are moving into the annular chamber 60 key 27 is entering the circumferential portion 36 of the keyway 23 so that the full force of the fluid under pressure reaches the nozzle 12 as it commences to rotate and the cleaning fluid is emitted in an arc of a size dependent upon the size of the circumferential portion 36 of the keyway. When the key 27 reaches the end of the keyway 23 the device is locked against further outward movement.

To restore the blower to its idle position the operator merely reverses the movement of the sheave wheel 28 by pulling on the opposite chain-fall. This backs the key 27 through the circumferential portion 36 of the keyway which rotates the rack tube 11 and nozzle 12 through the same blowing arc it has just completed but in a reverse direction. As the key 27 enters the longitudinal portion of the keyway 23 the ports 63 leave the annular chamber 60 and the blowing operation is complete but the valve 39 remains open. Continued retraction of the rack tube 11 brings the recess 56 opposite the valve 49, the valve stem 55 is forced into the recess by the spring 52 and the valve 49 is closed. This closing of the pilot valve 49 shutting off the exhaust of the fluid leaking past the valve piston 39 as it does results in a building up of pressure below the valve piston 39 until the pressure is so nearly equal on both sides of the piston that the force of the spring 41 forces it to its seat 40. The blower is then in its idle position and ready for another cleaning operation.

It is obvious that many minor changes may be made in the form, and construction of this invention without departing from the material principles thereof. It is not, therefore, desired to confine the invention to the exact form herein shown and described, but to include all forms coming within the purview of the attached claim.

What I claim as my invention is:

In a fluid heater cleaning apparatus, a blower tube having a nozzle at one end thereof, manual means for traversing said tube axially for projection into and from a fluid heater, and a source of pressure cleaning fluid supply, a valve guarding said source of supply, means for opening said valve to render available said source of supply to said nozzle, and means obstructing the projection of said tube by said manually operable means when the pressure on said source of supply falls below a predetermined value.

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