Jan. 24, 1939. J. W. L. SIMPSON 2,144,744

SOOT BLOWER

Filed Feb. 8, 1936 2 Sheets-Sheet 1

Fig. 1.

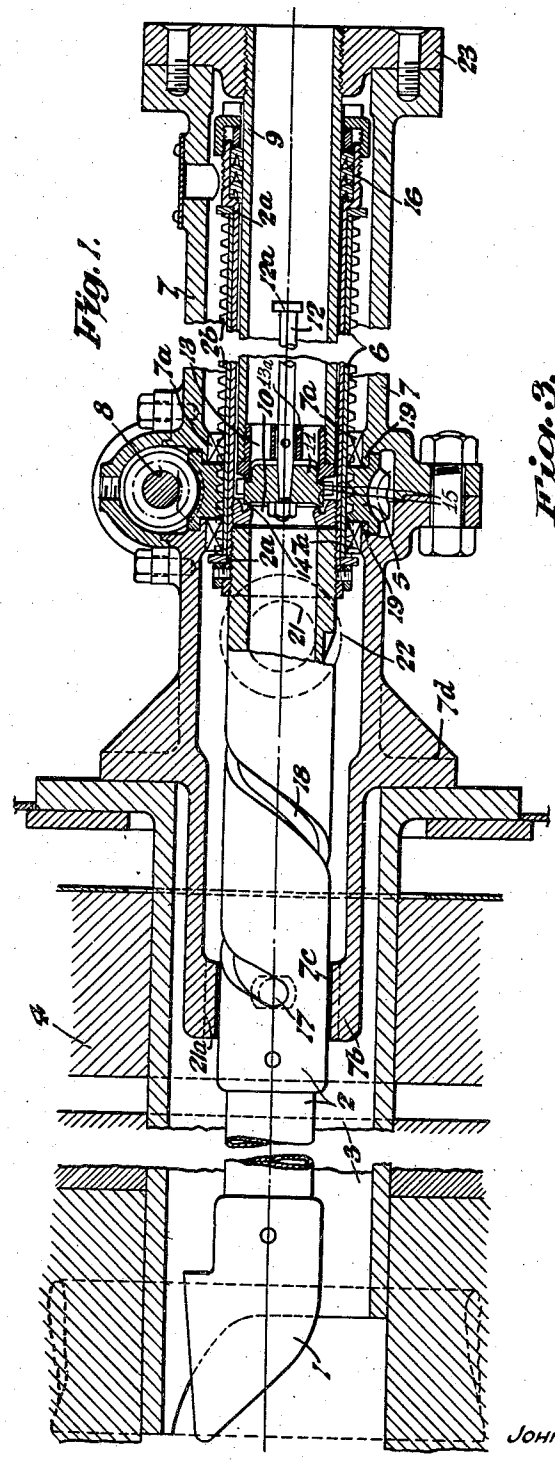
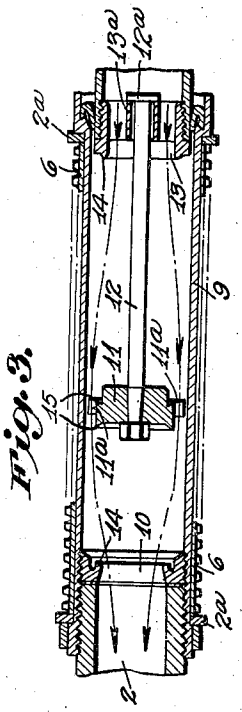


Fig. 3.



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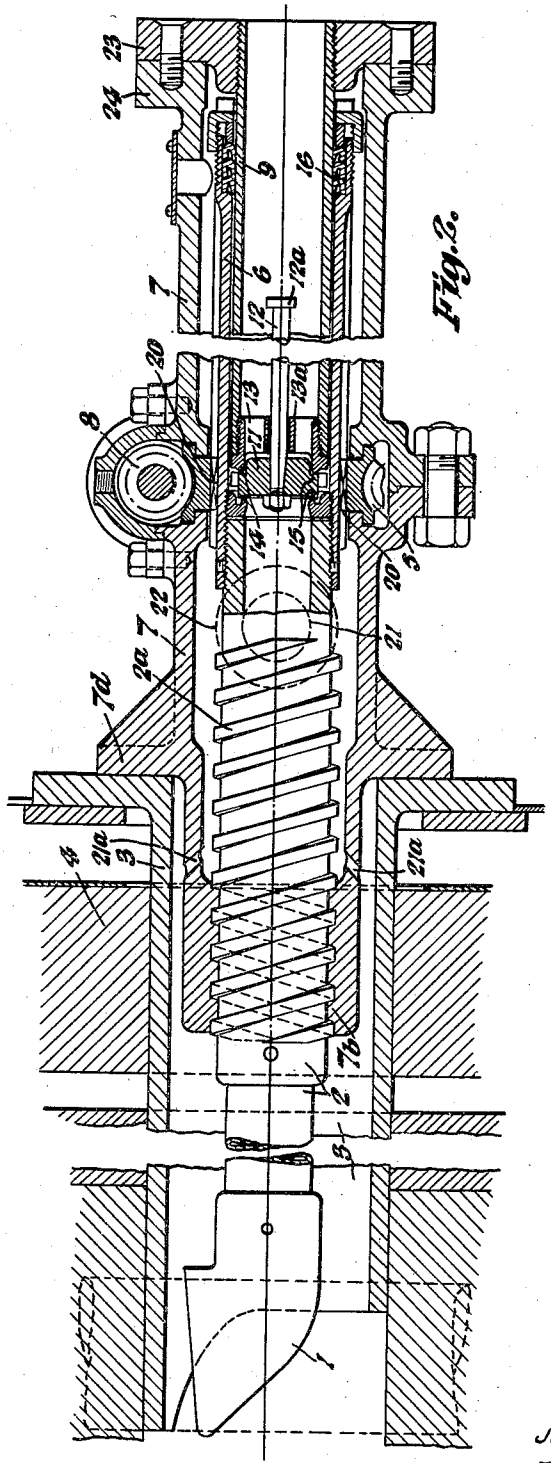


Fig. 2.

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2,144,744

SOOT BLOWER

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5 Claims. (Cl. 122—392)

This invention relates to soot blowers for boilers and the like of the type in which a nozzle carrying member is adapted to occupy a shielded or inoperative position in juxtaposition to the zone to be subjected to the influence of a pressure fluid medium and to be advanced to discharge the pressure fluid over the desired zone in order to loosen or remove the deposits of soot, dust and ashes given off from the fired fuel, from the boiler tubes, shell and other parts of the plant exposed to the gases.

In such devices it is known to advance the nozzle from the shielded or inoperative position by a combined movement of translation and rotation and to utilize this movement to bring into registration steam admission ports in the nozzle carrying member and the housing accommodating it. Owing to distortion and wear it is difficult to keep such a device fully steam-tight after considerable use.

An object of this invention is to provide a construction and arrangement of soot blower having a valve arranged in the pressure fluid conduit of the blower and adapted to be opened by the axial movement of the blower head to its operative position, and in which the reverse movement of the blower head is adapted to effect a positive closure of the valve. The arrangement may be such that the valve in its closed position may be clamped between two seatings by the action of withdrawing the blower head to its inoperative position so as to effectively prevent leakage of the pressure fluid.

According to this invention a soot blower of the type set forth is characterized by the means for controlling the supply of pressure fluid to the nozzle consisting of a valve and seating therefor and means to press one upon the other automatically upon retraction of the nozzle from the operative zone. The nozzle may be simply moved axially or may be rotated during the whole or part of its movement of translation by any of the well known means for effecting simultaneous sliding and rotation of a member, e. g. a worm or spiral groove in the member carrying the nozzle and a projection engaged therein. The nozzle may have a single outlet or a plurality of outlets.

One form of this invention may be summarized as comprising a blower head or nozzle adapted to eject pressure fluid, a housing therefor, a tube carrying said nozzle or blower head at one end, a pressure fluid supply conduit located in substantially co-axial continuity with said tube, means to effect a movement of translation and rotation to said tube relatively to said conduit, a valve normally pressed on a seating and controlled by the said movement of the said tube, said valve normally isolating the tube from the supply source of pressure fluid and adapted when the blower head or nozzle is projected to a predetermined operative position to be separated from said seating to allow pressure fluid to travel from said conduit to said tube and to maintain the supply of such pressure fluid during a predetermined portion of the movement of the blower head or nozzle. Means is preferably provided for causing a flow of cooling medium into the housing accommodating the nozzle whereby the nozzle is cooled and protected from oxidation due to the heat of the gases of combustion. A suitable indicating device can be provided with the nozzle to show when it has been brought to its operative position.

In order that this invention may be clearly understood and readily carried into effect I have appended hereto two sheets of drawings illustrating embodiments thereof, and wherein:—

Figs. 1 and 2 are broken sectional side elevation views of three forms of the invention.

Fig. 3 is a detail sectional view showing the valve employed for the embodiment shown in Fig. 1 and in which the nozzle is in the advanced position.

Referring to the drawings an air or steam injecting or spraying nozzle 1 is fitted to one end of a tubular conduit 2 arranged to be projected with an axial or axial and rotary movement from within a cylindrical chamber 3 in the wall 4 of the boiler shell or other part of the plant, the said movement being effected by a simple screw thread mechanism. This latter may be in the form of an annular worm wheel 5 threaded through which is a screw-threaded sleeve 6 free on the inner end of the nozzle conduit 2, and located between thrust washers 2a at each end. The screw-threaded sleeve 6 is provided with one or more longitudinal keyways or splines 2b which engage with fixed keys 7a in the housing 7. The worm wheel 5 is adapted to be operated by a worm 8 rotated directly by a hand wheel or by shaft and gearing from a remote control.

The inner end of the nozzle conduit 2 and the sleeve 6 is supported concentrically about a fixed fluid pressure supply conduit 9 and together with the worm wheel and worm is accommodated within the housing 7 projecting from the nozzle housing chamber 3 secured in the boiler shell or the like.

In the arrangements shown in Figs. 1, 2 and 3

the interior of the nozzle tube assembly is provided with an annular seating member 10 against which is engaged one side of the head 11 of a mushroom valve, the valve spindle 12 being mounted and guided in the fluid pressure supply conduit 9 in such manner that the side of the valve head remote from the seating 10 is normally engaged against a further seating member 13 arranged in the supply conduit 7, the faces of the said seating members 10 and 13 being formed with raised annular ridges 14 over which are engaged lap coned or lipped parts 15 of the piston like valve head 11 thereby forming a closure to the fluid pressure supply conduit when the apparatus is not in use, being preferably so formed to have a shrouding effect against erosion by the pressure fluid.

A suitable packing gland 16 is arranged at the end of the nozzle tube 2 remote from the nozzle to form a seal around the supply conduit 9 and in its forward movement the nozzle tube 2 is guided by a pin 17 projecting radially from the front end 7b of the nozzle tube housing chamber 7 into a shallow helical channel 18 cut into the nozzle tube, whereby the forward axial movement of the nozzle is accompanied by a simultaneous rotating movement. If the channel 18 be straight then a simple longitudinal movement will result.

The part of the housing accommodating the forward end of the nozzle tube is arranged as at 7c as a support or guide therefor, and this forward part of such housing is connected to a source of cooling medium through connection 21 so that cooling air can pass around the nozzle.

In operation the rotation of the worm 8 and worm wheel 5 by means of the handwheel or remote control system causes the advancement of the nozzle tube, the valve however remaining closed on its seating 10 by reason of the force exerted by the pressure supply fluid against the piston like head 11 of the valve. Continued movement of the nozzle tube however, brings a head 12a on the tail end of the valve rod 12 against a stop formed by a valve guide collar 13a formed concentrically in the annular seating member 13, radial webs joining the members 13 and 13a, the spacing of which allows free passage of pressure fluid therethrough. The valve seating 10 in the nozzle tube upon continued movement of the nozzle tube is then caused to move away from the valve head as shown in Fig. 4, allowing the passage of the pressure fluid from behind the piston head via a number of small radial passages 11a in the periphery of the valve head and from thence into the nozzle 1 the mouth of which may as shown be radially directed to obtain a wide sweeping effect.

Due to the inductive effect of the steam or air issuing from the nozzle, the valve 11 will always be maintained in a forward position until retracted by the reverse operation of the worm 8 and worm wheel 5.

The worm wheel may be mounted upon suitable bearings or as shown upon plain annular bosses 19 in the nozzle tube housing which may also be provided with channels or ports to drain off condensation of the steam or air supply.

The foregoing construction and operation of valve 11 is also adopted with the device shown in Fig. 2 which however employs a modified mechanism for advancing and rotating the nozzle tube 2. In common with the arrangements shown in Figs. 1 and 2 the casing 7 is arranged in two sections the forward one of which is provided with a suitable flange 7d between its ends by which it may be clamped to a suitable wall box, i. e. the hollow chamber 3, in the boiler or other casing. The nozzle 1 which is mounted at the end of a suitable tube is as shown normally located within this chamber 3.

In the said alternative method shown in Fig. 2 of imparting the combined axial and rotary movement to the nozzle the worm wheel 5, instead of forming a nut-like engagement of the worm wheel 5 with the screw-thread on the extended portion of the tubular nozzle carrying member, the worm wheel 5 is splined or keyed on the sleeve 6 as at 20 which sleeve is formed as an extension of the nozzle conduit 2 so that it may impart a rotary motion to the nozzle. The sleeve 6 is thus free to slide axially in the worm wheel but may be rotated through the splined connection between them. The tubular member 2 is provided with a screw-thread 2a which engages with a corresponding screw-thread formed in the part 7b of the casing 7. This screw-thread may be of a suitably steep pitch and may if desired be a multiple thread screw. Rotation of the worm and through it the worm wheel will then cause the tubular nozzle carrying member and the nozzle to be rotated and owing to the engagement of the screw-threaded parts the tubular member and its nozzle will also move in an axial direction.

The cooling medium may be admitted to the housing 7 by means of a conduit screwed into an aperture 21 in a bossed seating 22 on such housing so that the cooling medium will flow around most of the nozzle tube, and can flow out through passages 21a in the guide element 7b. The fixed pressure supply conduit 9 is securely threaded or otherwise fixed in a flange 23 which in turn is bolted to a flange 24 of the element housing 7. In the arrangement shown in Fig. 2 this conduit 9 is arranged at its rear end to receive or abut against a valve seating 25, and its opposite end is formed with a number of arcuate or radial ports 26 to allow of the passage of the pressure supply fluid to the nozzle tube, also with one or a pair of brackets or lugs 27 mounted in which is a suitable cam or trigger 28a the use of which is hereinafter described. The conduit 9 at its forward end is also arranged to act as a guide 28 for a valve spindle 29 the opposite end of which is located in the body of a spring loaded main valve 30, which acts as a closure to the fixed pressure supply conduit when the apparatus is not in use.

Concentrically placed with the above mentioned main spring loaded valve is a small spring loaded pilot valve 31. The rear portion of the main valve is formed as a sleeve 30a to house the spring 31a of the pilot valve and the spring 30b of the main valve and is suitably guided in an internally directed cylindrical cap 33 fitted in a valve cover 34, which is in turn attached to the flange 23 to which the pressure supply conduit is fixed. This valve cover has an inlet 35 to which the main pressure fluid supply is connected, and an apertured boss 36 is provided therein as a means for efficient draining. Adjustment of the springs is effected by means of an adjusting screw 37 which is threaded through the centre of the cap 33 which forms the main valve guide on the valve cover.

Where the worm operating mechanism is controlled by hand a suitable indicator device may be provided for indicating the position of the nozzle and stops may also be provided for limiting the extent of its movement.

It will be apparent from the foregoing that the valve mechanism is highly positive in operation, and if the valve becomes worn or unserviceable it is easily replaced without expensive work and loss of valuable time.

I claim:—

1. A soot blower for boiler tubes, and other suitable apparatus comprising a casing, a blower tube, a delivery nozzle on said blower tube, means for advancing and retracting the said nozzle, a valve relatively movable in said blower tube adapted to be pressed in a closure direction by the action of the pressure fluid for isolating the nozzle from the source of supply of pressure fluid, an annular seating in said blower tube for said valve, means for pressing said valve and seating together in the axial direction of the blower tube automatically upon partial retraction of said nozzle and also maintaining said valve and seating pressed together without relative sliding movement to form a positive seal during the completion of the retraction movement and also during the preliminary stage of the outward movement of the blower tube, and means for automatically separating said valve from said seating in the blower tube after a predetermined outward movement of the nozzle.

2. A soot blower for boiler tubes, and other suitable apparatus comprising a casing, a blower tube, a delivery nozzle on said blower tube, means for advancing and retracting the said nozzle, a valve in said blower tube for isolating the nozzle from the source of supply of pressure fluid, a seating in said blower tube for said valve, means for pressing said valve and seating together in the axial direction of the blower tube automatically upon partial retraction of said nozzle and also maintaining said valve pressed on said seating during the completion of the retraction movement and also during the preliminary stage of the outward movement of the blower tube, means for automatically separating said valve from said seating in the blower tube after a predetermined outward movement of the nozzle, and a further seating arranged as a fixture in rear of the said valve and between which further seating and the beforementioned seating the valve is pressed upon complete retraction of said blower tube.

3. A soot blower for boiler tubes, and other suitable apparatus comprising a casing, a blower tube, a delivery nozzle on said blower tube, means for advancing and retracting the said nozzle, a valve in said blower tube for isolating the nozzle from the source of supply of pressure fluid, an annular seating in said blower tube for said valve, means for pressing said valve and seating together in the axial direction of the blower tube automatically upon partial retraction of said nozzle and also maintaining said valve and seating pressed together without relative sliding movement to form a positive seal during the completion of the retraction movement and also during the preliminiary stage of the outward movement of the blower tube, means for automatically separating said valve from said seating in the blower tube after a predetermined outward movement of the nozzle, a stem projecting rearwardly from said valve, a fixed guide for said stem, and an abutment on said stem remote from the valve head end and adapted to abut against said guide after the predetermined outward travel of the blower nozzle, the arrangement being that the head of the valve follows the movement of said blower tube and is maintained on said seating by the influence of the pressure fluid until said abutment engages said guide, and upon partial retraction of the nozzle is engaged by the seating in the blower tube.

4. A soot blower for boiler tubes, and other suitable apparatus comprising a casing, a blower tube, a delivery nozzle on said blower tube, means for advancing and retracting the said nozzle, a valve in said blower tube for isolating the nozzle from the source of supply of pressure fluid, a seating in said blower tube for said valve, means for pressing said valve and seating together in the axial direction of the blower tube automatically upon partial retraction of said nozzle and also maintaining said valve pressed on said seating during the completion of the retraction movement and also during the preliminary stages of the outward movement of the blower tube, means for automatically separating said valve from said seating in the blower tube after a predetermined outward movement of the nozzle, a further seating arranged as a fixture in rear of the said valve and between which further seating and the beforementioned seating the valve is pressed upon complete retraction of said blower tube, a stem projecting rearwardly from said valve, a fixed guide for said stem, and an abutment on said stem remote from the valve head end and adapted to abut against said guide after the predetermined outward travel of the blower nozzle, the arrangement being that the head of the valve follows the movement of said blower tube and is maintained on said seating by the influence of the pressure fluid until said abutment engages said guide, and upon partial retraction of the nozzle is engaged by the seating in the blower tube.

5. A soot blower for boiler tubes, and other suitable apparatus comprising a tubular casing, a blower tube supported in said casing, a delivery nozzle on said blower tube, a threaded coaxial rearward tubular extension on said blower tube, a nut supported in said tubular casing and engaged about said extension, a fixed fluid pressure supply conduit extending from one end of said housing into the said rearward extension of the blower tube, means for rotating said nut and restraining said extension against rotation to advance and retract the said blower tube axially upon said pressure fluid supply conduit, a mushroom valve within said tubes for isolating the nozzle from the source of supply of pressure fluid, an annular seating in one of said tubes for said valve, said valve being so directly exposed to the pressure of the fluid as to be pressed towards said seating in the direction of flow of the fluid, means for pressing said valve and seating together in the axial direction of the blower tube automatically upon partial retraction of said nozzle and also maintaining said valve pressed on said seating during the completion of the retraction movement and also during the preliminary stage of the outward movement of the blower tube, and means for automatically separating said valve from said seating in the blower tube after a predetermined outward movement of the nozzle.

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