May 30, 1944. W. P. THOMAS 2,350,202

SOOT BLOWER CONTROL

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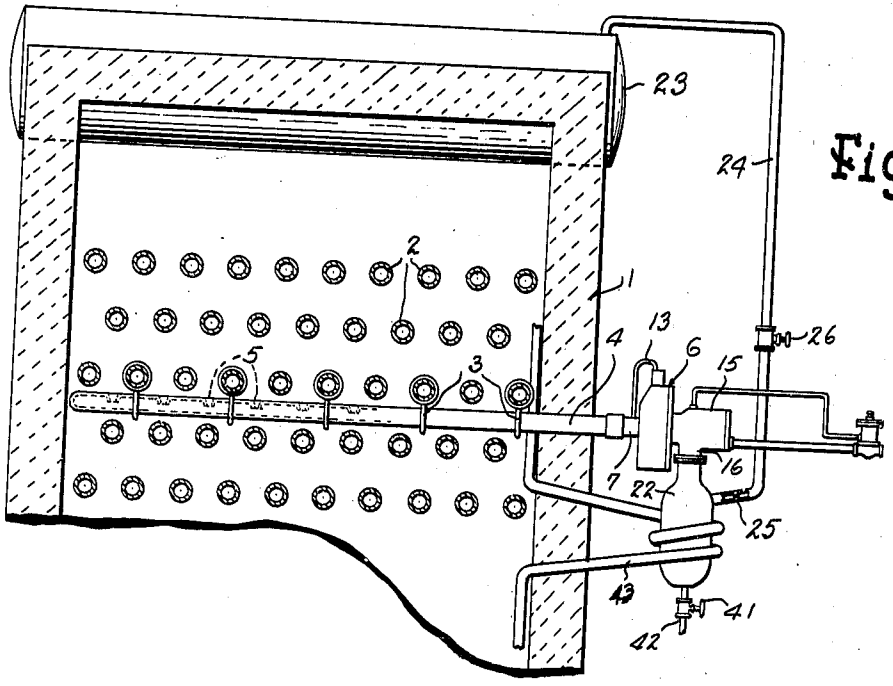


Fig. 1.

Fig. 3.

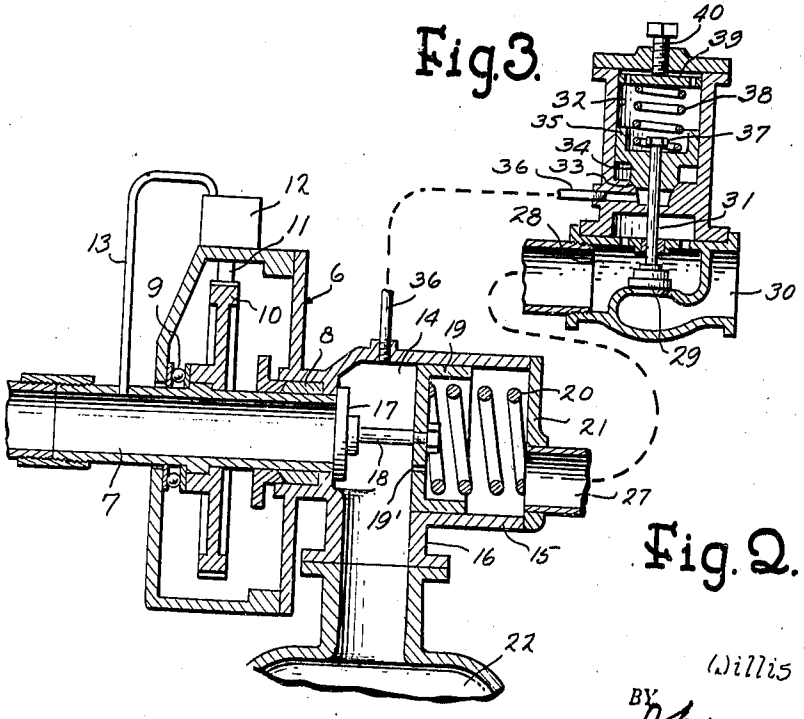


Fig. 2.

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SOOT BLOWER CONTROL

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3 Claims. (Cl. 122—392)

This invention relates to puff blowers such as are used in cleaning soot and residue from the exterior of steam boiler tubes, and has for its object to provide an improved means for storing small quantities of steam from the boiler for most efficient use in blowing.

The two systems in most common use for blowing soot deposits from boiler structures are the continuous blowing method, whereby steam or air under pressure is vented through blowers continuously during the blowing period, and the puff system in which air under pressure is vented at short intervals. In continuous blowing the amount of steam withdrawn from the boiler often reduces the boiler pressure since it represents a considerable portion of the boiler output. This is undesirable in many cases. Where an air system is used it is, of course, necessary to provide a separate source of compressed air supply.

It is, therefore, the principal object of this invention to provide a puff steam system by which small draw-off of steam from the boiler, insufficient to reduce the boiler pressure may be continuously made and stored, and vented automatically through blowing tubes when the pressure in the storage means becomes sufficiently high.

More particularly, it is an object to provide a steam shunt or bleed line from the main boiler to a storage tank located in close proximity to the blowing tube together with automatic valve means opened by the pressure in the reservoir when it attains a predetermined amount.

Another object is to provide separate valve means in the bleed line so that the draw-off may be regulated by an operator to accord with the steam available, the blowing pressure required and the intervals between blowing, as he may deem best.

Other objects and advantages will become more fully apparent as reference is had to the accompanying drawing wherein my invention is illustrated, and in which

Fig. 1 is a partial section through a boiler equipped with a blowing tube connected to and controlled by my invention, shown in side elevation,

Fig. 2 is a vertical longitudinal section through the outer end of the blower tube and associated parts, and

Fig. 3 is a vertical longitudinal section through the control valve of Fig. 1.

More particularly, 1 indicates a boiler, generally, having a plurality of rows of tubes 2. A plurality of bearings 3 depend from the tubes 2 and support the soot blower element or blower tube 4. This tube has a plurality of orifices or jets 5 along the length thereof, each of which is adapted to discharge steam against the external walls of the tubes 2 to dislodge the soot and other residue from the products of combustion flowing thereover.

Located outwardly of the boiler 1 is a head 6 to which the blower tube 4 is secured by means of the extension 7. A journal 8 and a thrust bearing 9 support the tube for rotation by the ratchet wheel 10 being actuated by a pawl 11 carried by a piston in the cylinder 12. A steam line 13 connects the cylinder 12 with the interior of the extension 7 so that each time steam is inletted in the extension 7 pressure in the line 13 causes the wheel 10 to rotate one or more notches, as may be predetermined. This rotation causes rotation of the blower tube through a desired arc.

Carried by the blower head 6 is a chamber which consists of a valve chamber 14, a cylinder 15 and a major inlet portion 16. The valve chamber 14 houses a valve 17 which seats upon the end of the blower tube extension 7. Extending across the valve chamber is a valve rod 18 which is secured to the valve 17 at one end and to a piston 19 at its other end, the piston being slidable in the cylinder 15 against the resistance of a spring 20 which urges the valve 17 to a seating position. The piston 19 has a port 22 therethrough to establish continuous communication between the valve chamber 14 and the cylinder 15. The major inlet portion 16 connects directly into a steam reservoir 22 which is in open communication with a source of steam blowing pressure supply, here illustrated as being from the super heater 23, by means of a tube 24 of comparatively small diameter. If the tube 24 is of relatively large diameter then an orifice 25 of small diameter is inserted therein to restrict the volume of steam which may pass therethrough in an amount such that there is no appreciable or substantial drop in the boiler pressure. A manually operable valve 26 is inserted in the line 24 so that this line may be closed when blowing is not desired. A pipe 27 leads from the cylinder head 21 to a second valve chamber 28 having a valve 29 therein which guards the outlet 30. The stem 31 of this valve extends upwardly into a housing having a cylindrical upper portion 32 and a restricted lower portion forming a seat 33 for a valve 34 formed on the lower end of the piston 35 which is slid-

ably mounted in the cylinder 32. A pipe line 36 leads from the valve chamber 14 into the housing below the valve 34. The valve stem 31 projects freely through the piston 35 and has a head 37 in slightly spaced relation therewith so that the valve 34 may be lifted from its seat against the resistance of the spring 38 and, during the subsequent more rapid movement, elevate the valve 29. The spring 38 presses upwardly against a head plate 39 having a screw 40 which passes through the head of the cylinder 32 so that pressure on the spring 38 may be varied.

The operation is as follows: suppose that the valve 26 is manually opened thus allowing steam under pressure to flow from the heater 23 through the line 24 until the pressure in the reservoir 22 gradually builds up to a predetermined blowing degree. The cylinder 15 and the valve chamber 28 will be at the same pressure. The pressure at which blowing will occur will depend on the pressure exerted by the spring 38. When the pressure in the chamber 14 attains this amount the valve 34 will be forced from its seat 33 thus inletting steam to the bottom of the piston 35. This causes rapid elevation of the piston 35 which contacts the head 37 of the valve 29 thus lifting this valve. Upon elevation of the valve 29 the steam is vented from the chamber 28 and from behind the piston 19 thus permitting the pressure in the chamber 14 to drive the piston 19 to the right, as viewed in Fig. 2. This opens the valve 17 admitting steam into the blower tube 7, 4 where it exits through the orifices 5 as the tube is rotated by the wheel 10 and the pawl 11. As soon as the pressure in the reservoir 22 drops a substantial amount the spring 20 closes the valve 18, the valve 29 closes and pressure again begins to build up in the reservoir 22.

Before beginning blowing or after blowing is completed the valve 41 in the drain line 42 may be opened to rid the reservoir 22 of water.

Whether or not the reservoir 22 needs to be supplied with some heat depends upon its size, its proximity to the boiler, the radiation from the boiler etc. In the event that it is desirable to supply some heat it may be done in any one of a number of ways, one of which is illustrated in the form of a tube 43 having one turn around the reservoir and supplied with steam or hot water from the boiler 1.

What I claim is:

1. A steam puff system for scavenging soot deposit from the interior of a boiler comprising a blower tube head having a valve guarded blower tube projecting outwardly therefrom, said head forming a valve chamber for said valve, a reservoir open to said chamber and having a feed line of small diameter continuously opening thereinto from the boiler, said head having a spring pressed piston slidable therein and connected across said valve chamber to said valve, said piston having an opening of small diameter leading into a vent line, a control valve in said vent line, a valve cage housing the stem of said control valve, said stem having a pressure responsive valve spring pressed toward its seat and in a direction to close said control valve, a pressure line of materially smaller diameter than that of said feed line leading from said reservoir to the space beneath said pressure responsive valve, said pressure responsive valve being adapted to be elevated from its seat when the pressure therebeneath exceeds the counterpressure exerted by the spring thereabove and to remain open as long as the fluid pressure on said reservoir is sufficient to overcome said counterpressure, said pressure responsive valve upon lifting from its seat elevating said control valve to relieve the pressure behind said piston whereby said piston moves against its spring to open the first named valve leading to said blower tube.

2. A steam puff system for scavenging soot deposit from the interior of a boiler comprising a blower tube head having a valve guarded blower tube projecting outwardly therefrom, said head forming a valve chamber for said valve, a reservoir open to said chamber and having a feed line of small diameter continuously opening thereinto from the boiler, said head having a spring pressed piston slidable therein and connected across said valve chamber to said valve, said piston having an opening of small diameter leading into a vent line, a control valve in said vent line, a valve cage housing the stem of said control valve, said stem passing through a pressure chamber and having a pressure control valve therein which when closed forms one wall of said chamber, a spring urging said pressure control valve toward seating position which also urges said control valve towards its seat, a pressure line of materially smaller diameter than that of said feed line leading from said reservoir to said pressure chamber, said pressure responsive valve being adapted to be maintained elevated from its seat as long as the pressure therebeneath and in said reservoir exceeds the counterpressure exerted by the spring thereabove, said pressure responsive valve upon lifting from its seat elevating said control valve to relieve the pressure behind said piston whereby said piston moves against its spring to open the first named valve leading to said blower tube, said pressure responsive valve seating in response to a drop in pressure in said reservoir.

3. In a puff blowing device for a blower tube, the combination of a valve guarding the tube, a piston for said valve having a port leading into a vent line and a spring therebehind urging said valve to seated position, a fluid pressure reservoir to which said valve is exposed whereby said port bleeds said reservoir, a second valve guarding said vent line, said second valve when closed causing pressure to build up in said vent line thereby balancing the fluid pressure on each side of the first named piston, said second valve having a piston on the stem thereof, and a fluid line leading from said reservoir to one face of said piston in such manner that the pressure therein when sufficient will open said second valve, said second valve when opened bleeding the fluid under pressure from behind said first named piston whereby the fluid pressure in said reservoir overcomes the spring pressure behind the first named piston and opens the first named valve, said second valve remaining open so long as the fluid pressure in said reservoir is sufficient to overcome the spring pressure acting on said second piston and closing in response to a drop in pressure in said reservoir below said spring pressure.

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