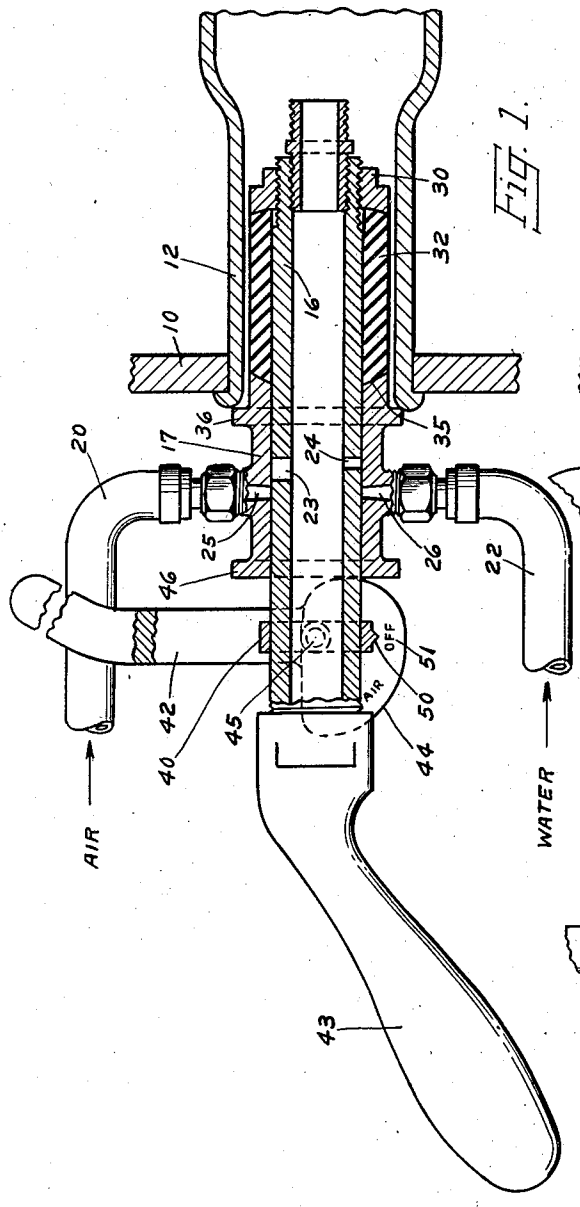
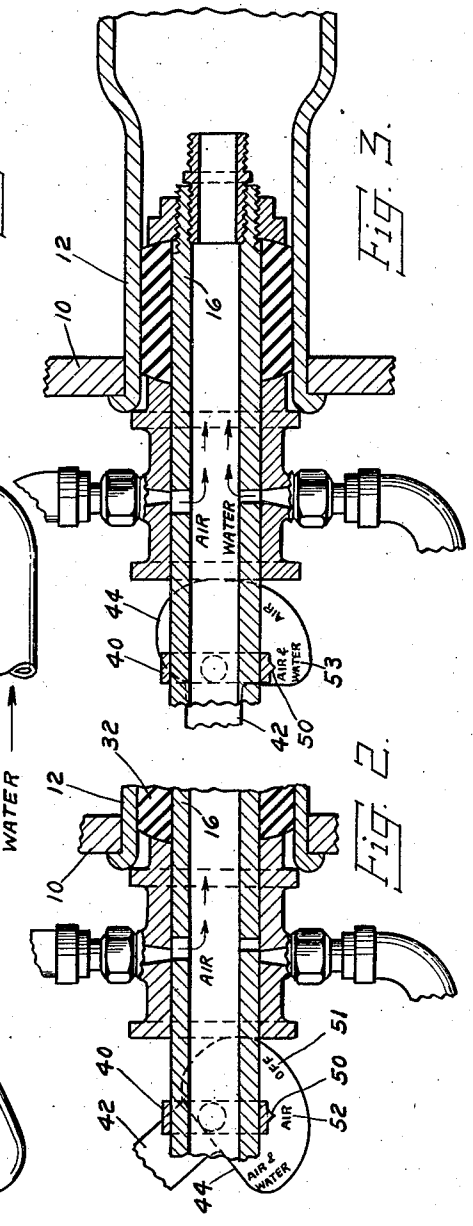
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FLUE WASHING NOZZLE HAVING FLUID VALVE OPERATED SIMULTANEOUSLY WITH SEAL IN FLUE

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FLUE WASHING NOZZLE HAVING FLUID VALVE OPERATED SIMULTANEOUSLY WITH SEAL IN FLUE

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The present invention relates to washing apparatus for cleaning tubes or pipes and particularly the flues of a fire tube boiler of the locomotive type.

The washing of the flues of a locomotive boiler is a tedious task because it requires not only the transfer of the washing nozzle from flue to flue and the securing of the washing nozzle seal in place in each flue so as to prevent the back flow of water but also requires turning on and off the supply of water and/or air, or both fluids when cleaning each flue and upon transferring the tool to the next flue. The present invention contemplates the provision of a flue washing device which may be easily and speedily manipulated by an operator and which permits the speeding up of the washing operation by automatically turning on and off the supply of cleaning fluid simultaneously with the operation of establishing or breaking the seal between the cleaning nozzle and each flue.

Figure 1 in the accompanying drawing is a sectional elevational view illustrating my improved washing apparatus as used for cleaning the flues of a locomotive boiler.

Figures 2 and 3 are partial views similar to Figure 1 but illustrating operating conditions in which the supply of first one and then two fluids to the cleaning nozzle is automatically established.

In the drawing the numeral 10 designates the back tube sheet of a locomotive boiler into which are rolled the rear ends of the fire tubes or flues 12. As is well known it is necessary to periodically clean the flues of a locomotive boiler because they may become either partially or completely blocked with cinders, etc., after a period of use. Many forms of washing apparatus have been employed, ranging from a simple hose for injecting a stream of water into a boiler to complicated washing nozzles having complex attachments for securing the washing tube in the flue and preventing the back flow of water.

The washing device described herein embodies a nozzle tube 16 which is inserted in a flue for injecting a stream of washing fluid from its distal end. The tube 16 extends at its outer end through a ported sleeve 17 connected with flexible hose lines 20 and 22 that supply air and water, respectively, to the nozzle when ports 23 and 24 in the wall of tube 16 are alined upon axial movement thereof with the ports 25, 26 in the wall of sleeve 17.

At its distal end the nozzle tube 16 is threaded to receive a nut 30 that forms a shoulder abutting which is an annular packing sleeve 32 of distortable material, such as rubber, mounted on the tube 16 between the nut 30 and the inner end 35 of sleeve 17 with respect to which the tube 16 is slidably mounted. The sleeve 17 is provided with a flange 36 adapted to bear against the end of the flue 12 into which the nozzle tube is inserted. A collar 40 fixed to the outermost portion of tube 16 pivotally supports a lever 42 at its lower bifurcated end on which are mounted cams 44 eccentric to the pivoting axis 45 of the lever. The cams 44 act against the outer end face 46 of sleeve 17. When the nozzle 16 is inserted in a flue with the flange 36 of sleeve 17 abutting the end of a flue 12 and lever 42 is pulled back while the tool is pressed toward the flue by handle 43, the cams 44 are turned counterclockwise and the reaction of the force applied against the flue through the sleeve 17 and its flange 36 causes the nozzle tube 16 to be drawn rearwardly with respect to the sleeve 17 thereon. As a consequence of this, the nut 30 at the distal end of the nozzle tube in moving rearwardly compresses the packing 32 and causes it to be distorted radially into contact with the inner wall surface of the flue 12. This seals the outer end of the flue so that when either air or water are supplied to the nozzle the stream will not gush back upon striking an obstruction in the flue so as to splash on the operator. The construction and arrangements described herein for effecting a seal between the washing nozzle and flue wall form the subject matter of an application for Letters Patent filed in the name of Jobe Dangerfield, under Serial No. 630,472, on November 23, 1945.

In cleaning completely blocked flues it often is desirable to first open at least a small passage through the cinders, etc., in order to reduce resistance to the washing operation. This may be done by inserting a conventional compressed air lance in the flue or utilizing a probing rod to force an aperture through the mass of cinders. However, in accordance with the present invention the port 23 in tube 16 is so located with respect to its port 24 and the air and water supply ports 25, 26 in sleeve 17 that the initial axial movement rearwardly of tube 17 alines its port 23 with port 25 in sleeve 17 (Fig. 2) so that as soon as packing 32 has been expanded to seal the flue, air is supplied to tube 17 and before the water supply is established. This causes a jet of air to issue from the distal end of the nozzle tube to open a passage through any mass of cinders etc. that may be blocking the flue. When lever 42 is drawn back further the continued rearward movement of tube 16 alines its port 24 with the water port

in sleeve 17 (Fig. 3) to supply water for washing out the flue. An indicator boss 50 on collar 40 and indicia 51, 52 on cams 44 may be provided to show the condition of fluid supply. By making air port 23 of sufficient size to extend axially of tube 16 so that communication with port 25 in sleeve 17 is maintained when water ports 24 and 25 are alined, the air supply overlaps the water supply with the result that the force of the air jet is added to the water stream for more effectively washing the flue.

When lever 42 is turned clockwise the reduction of force applied against the end 40 of sleeve 17 as cams 44 retract permits the resilient expansion of packing 32 to move tube 16 forwardly and even after the tube travels far enough to move its port 24 from alinement with the water supply port 26 the position of Fig. 2 is reestablished and supply of air through ports 23, 25 continues in order to provide an air jet serving to dry out the flue. Further movement of lever 42 to the "off" position shuts off the supply of air and enables expansion of packing 32 to also complete disestablishment of the seal between the cleaning nozzle and the flue wall.

With the cleaning tool described above the washing of the flues of a locomotive type boiler may be performed expeditiously inasmuch as the cam and lever arrangement for expanding the distortable packing 32 enables the making and breaking of the seal at the outer end of the flue and the turning on and off of the air and water streams to be performed quickly and thereby reduces the amount of time required in transferring the tool from flue to flue and placing it in operation each time.

What I claim is:

1. Demountable apparatus for cleaning the interiors of tubes such as flues of a locomotive boiler comprising; an axially movable nozzle tube insertible in a flue having a pair of axially spaced ports formed in a portion of its wall located exteriorly of the flue; sealing means carried by said tube for preventing back flow from the flue of fluid supplied to the nozzle; a sleeve or the like surrounding said outer portion of said nozzle tube and formed with a pair of ports therein adapted to be alined each with one of the ports in said nozzle tube for admitting fluid thereto; means connected to said sleeve for supplying two separate streams of cleaning fluid to said nozzle through the pair of ports in said sleeve and the alined ports; means for moving said nozzle tube axially sequentially to two spaced positions and acting to seal the flue, aline first one and then the other of the axially spaced ports on said nozzle with the corresponding port in said sleeve for introducing first one and then the other stream of a cleaning fluid to said nozzle.

2. Demountable apparatus for cleaning the interiors of tubes such as flues of a locomotive boiler comprising; an axially movable nozzle tube insertible in a flue having a pair of axially spaced ports formed in a portion of its wall located exteriorly of the flue; sealing means carried by said tube for preventing back flow from the flue of fluid supplied to the nozzle; a sleeve or the like surrounding said outer portion of said nozzle tube and formed with a pair of ports therein adapted to be alined each with one of the ports in said nozzle tube for admitting fluid thereto; means connected to said sleeve for supplying two separate streams of cleaning fluid to said nozzle through the pair of ports in said sleeve and the alined ports; means for moving said nozzle tube axially sequentially to two spaced positions and acting to seal the flue, aline first one and then the other of the axially spaced ports on said nozzle with the corresponding port in said sleeve for introducing first one and then the other stream of a cleaning fluid to said nozzle; said ports in said sleeve being so formed and arranged that the period of registration of said other port means in said nozzle with the related port in said sleeve overlaps the registration of said one port in said nozzle with the corresponding port in said pipe so that in the second position of said nozzle both streams of fluid are supplied thereto.

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The following references are of record in the file of this patent:

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