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GAS WASHING APPARATUS

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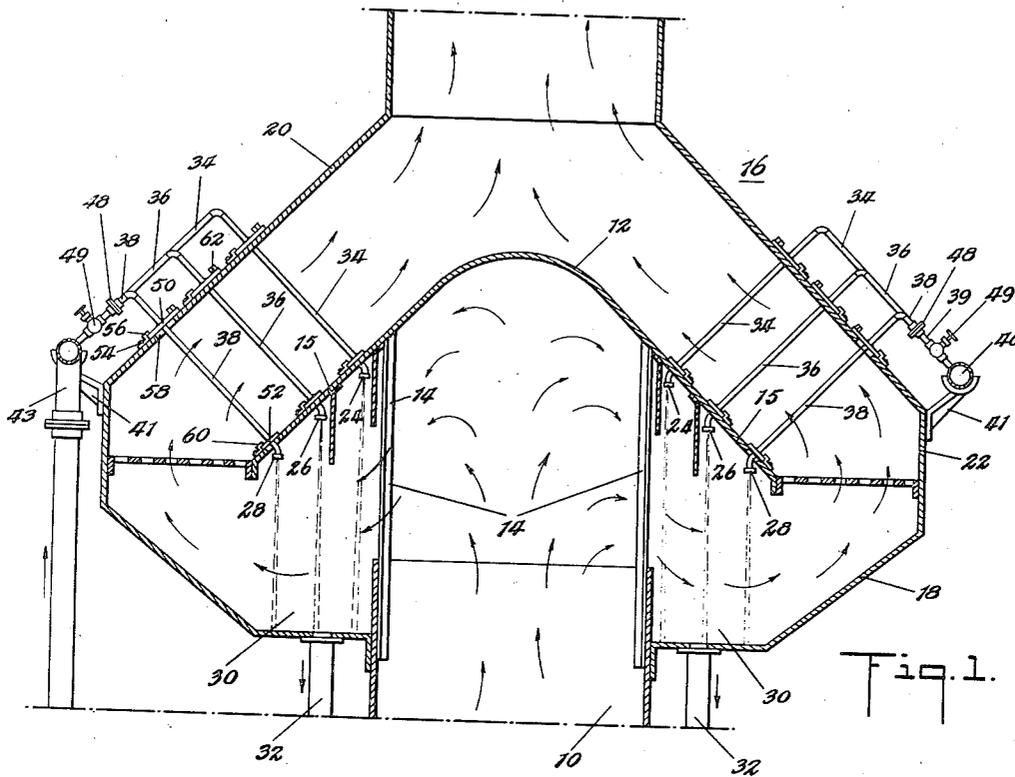


Fig. 1.

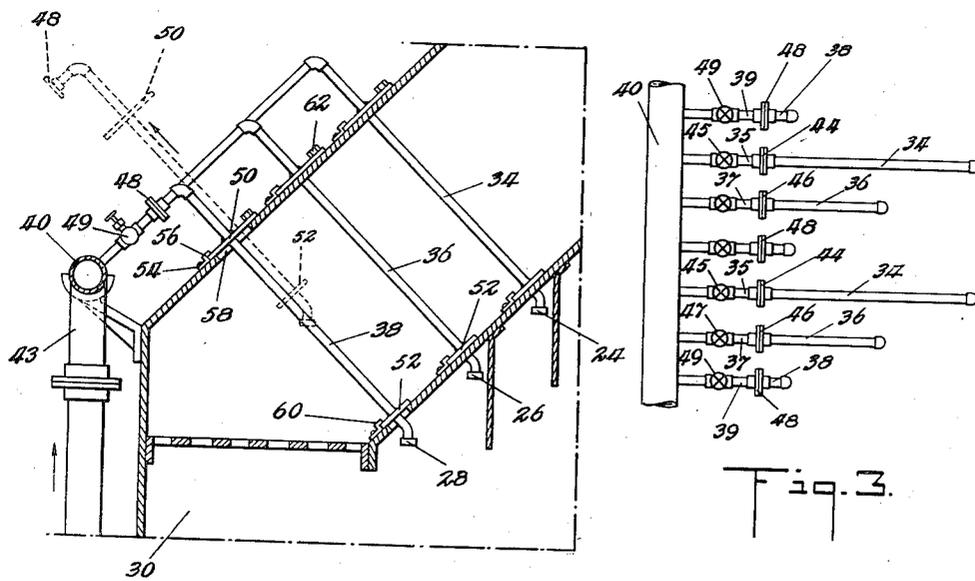


Fig. 2.

Fig. 3.

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GAS WASHING APPARATUS

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3 Claims. (Cl. 261—118)

This invention relates to an improved apparatus for washing gases to remove soot, ashes, dirt and other solid particles and also to remove objectionable fumes such as sulphur compounds, acid fumes and objectionable odors. Examples of the gases to be washed are exhaust gases from furnaces, dust-laden air and gases from metallurgical plants, such as melting furnaces of metal-casting plants. The invention is applicable to ship as well as land installations. This invention is an improvement upon the construction shown in my prior Patent No. 1,948,348, patented Feb. 20, 1934.

It is an object of the invention to provide an improved construction which may be applied at the top of a smoke stack or the like or in the breeching between the boilers, preheaters and stacks, to wash the exhaust gases by passing them through concentric curtains of water before they are discharged to the atmosphere.

Another object is to provide means for removing the spray nozzles of the water curtain, individually, without entering the stack or washer and without shutting down the whole installation, when it becomes necessary to clean or repair a nozzle.

Another object is to provide for testing the apparatus from the outside to determine which, if any, spray nozzles are not functioning properly.

Another object is to provide an improved and simplified construction of the above type which employs but one header for all the spray nozzles.

The three figures of the drawing illustrate an embodiment of the invention in which:

Fig. 1 shows a cross section through the top of the stack;

Fig. 2 is a longitudinal sectional view showing the arrangement of spray pipes; and

Fig. 3 is a top view of the spray pipe assembly.

Referring to the drawing, the apparatus may be mounted on the atmospheric end of a stack 10, here shown as of sheet metal, but the invention is equally capable of use on any other kind of stack. Alternatively, the apparatus may be placed in the breeching between the boilers, preheaters and stacks or used without a stack. If the device is used in a ship it may be placed above the fidley top.

In order to deflect the gases downwardly and outwardly over the edge of the stack 10 a dome or hood 12 is positioned above the stack end, being supported in such position by L struts 14. The edge of the dome extends beyond the periphery of the stack, as at 15.

To form an enclosed passage for the gases,

there is provided an outer wall or housing 16, which in practice is made up of a plurality of metal plates suitably riveted or welded together. As shown, the lower portion 18 of the housing is frusto-conical, as is also the upper portion 20, these portions being joined by a cylindrical portion 22. The lower portion 18 may be riveted to and supported upon the stack. The upper portion 20 may support a cylindrical section for passing the washed gases to the atmosphere, or, if the apparatus is placed in the breeching between the boilers and the stack the upper section may feed into the breeching leading into the stack. The apparatus may also be placed in any other desired conduit.

For washing the gases three concentric curtains of water are formed by water issuing from three concentric rings or sets of spray nozzles 24, 26, 28. The nozzles of each set are spaced apart and are formed to spread the streams of water fan-like so as to form a complete cylindrical curtain. The water is directed into a trough 30 formed in the lower portion 18 of the housing 16, and is drained off through pipes 32, for recirculation, treatment or to waste.

The construction as thus far described is similar to that in my prior Patent 1,948,348.

The present invention is an improvement upon the prior construction in the respect that in the present construction each nozzle is individually connected by pipes, as 34, 36, 38 and 35, 37, 39, respectively, to a single header 40 which is supported upon brackets 41 mounted on the outside of the cylindrical part 22 of the housing. The connecting pipes 34, 36, 38 pass directly through the housing wall 20 and through the hood extension 15 as illustrated. The header is supplied by a feed pipe 43. In order that the supply to any nozzle may be cut off without stopping the operation of any other nozzle or part of the apparatus, control valves 45, 47, 49 may be inserted in each of the pipe lines 35, 37, 39, respectively. In order that each nozzle may be individually removed from the apparatus for repair, replacement or cleaning, the pipes 34, 36, 38 are joined to pipes 35, 37, 39 by union joints 44, 46, 48, respectively. Thus when valve 49, for example, is turned off, the accompanying union 48 may be disconnected and the pipe 38 can then be detached from the housing 16 and removed from the apparatus.

To provide for ready removal of each nozzle and its connecting pipe, individually, from the outside (taking pipe 38 for an example) collars 50, 52 are welded or otherwise attached to the

pipes at the point where the pipes pass through the wall 20 of the housing and through the extending portion of the hood. To secure the collar 50 against the exterior face of the housing wall 20 an arcuate bracket 54 or holding plate, having an offset arcuate lip 56 is secured to the wall adjacent the lower edge of an aperture 58 which is provided for passage of the pipe. The lower edge of the collar 50 fits under the lip 56.

10 The outer collar 50 is locked to the housing wall 20 by bolt 62. A similar arcuate bracket 60 is provided for holding the inner collar 52 against the upper surface of the hood.

But no means to lock the inner collar 52 to the hood extension 15 is provided. Thus, when the bolt 62 is removed, both the inner and outer connections of the pipe 34, to the hood extension 15 and housing wall 20, respectively, are free so that the collars 50, 52 may be slid laterally over the surfaces of the hood extension and housing wall by manipulation from the upper or outer end of the pipe and the pipe and nozzle can be removed by operations executed entirely from the outside of the apparatus. Necessarily, the aperture 58 in the housing wall 20 and a similar aperture 64 in the hood 12 must be large enough to permit lateral movement of the pipe to disengage the collars 50, 52 from brackets 56 and 60 and also to permit withdrawal of the pipe with the collar 52 and nozzle attached.

It will be obvious that valves 45, 47, 49 may be eliminated and that in such a case if it be desired to remove a nozzle, the operation of the apparatus may be stopped for so long as it may be necessary to disconnect the union joint and put a temporary plug in the line. This interruption will not last more than two or three minutes. A temporary cover may also be placed over the aperture 58. Thus, the operation of the apparatus even without the valves may be substantially continuous during repairs.

An important advantage of my invention is the ability to test from the outside the condition of flow through each individual nozzle. This may be accomplished by feeling the portions of the conducting pipes 34, 36, 38 which are outside the housing 16. Due to the continuous passage of hot gases by the portions of these pipes which are between the housing wall 20 and the hood 12, a pipe will heat up if the flow of the water through it is stopped or materially limited, and this abnormal heated condition will give indication that pipe and nozzle must be inspected for repair or replacement.

From the foregoing it will be apparent that my improved apparatus provides for substantially continuous operation during testing and repairing, eliminates the necessity of entering into the apparatus during repairs and permits removal of an individual nozzle from the exterior of the apparatus, and affords means to test the condition of the apparatus and each nozzle thereof from the outside. It also simplifies the construction by requiring but a single header for all three sets of spray nozzles and water curtains.

Other objects and advantages of my invention will occur to those skilled in the art. Therefore I do not limit the invention to the precise form described and illustrated.

I claim—

1. In a device for washing gases being conducted upwardly, means over the gas-conducting means to deflect the gases through a water curtain, housing means, means for forming a water curtain comprising a series of nozzles in combination with individual water conduits extending through openings in said deflecting and housing means to each nozzle, a coupling in each conduit outside said housing means enabling the removal individually of any nozzle from said apparatus from the exterior and detachable means to seal the openings, the sealing means for the opening in said deflecting means being removable through the opening in said housing means and being detachable by manipulation from the outside of the apparatus.

2. In a device for washing gases, means for conducting the gases upwardly, means over the gas-conducting means to deflect the gases through a water curtain having openings therein with lips, housing means also having openings with lips, means for forming a water curtain comprising a series of nozzles, a header outside the housing means for supplying all the nozzles, in combination with individual water conduits extending through the openings in said deflecting and housing means connecting each nozzle to said header, a coupling in each conduit outside said housing means enabling the removal individually of any nozzle from said apparatus from the exterior and sealing means for said openings, said sealing means comprising plates attached to the conduits and engaging with lips on said deflecting and housing means, each plate for the deflecting means being disengageable from its lip and being removable through the opening in said housing means by manipulation of said conduit from the exterior of the apparatus.

3. In a device for washing gases which are being conducted upwardly, means over the gas-conducting means to deflect the gases through a water curtain, housing means, means for forming a water curtain comprising a series of nozzles, a header, individual water conduits extending through openings in said deflecting and housing means and connecting each nozzle to said header, and detachable connecting means in said individual conduits outside said housing means whereby any conduit and its associated nozzle may be disconnected from the header from the exterior without the necessity of entering or shutting down the apparatus, in combination with detachable means associated with said conduits to seal the openings in said housing and deflecting said sealing means being detachable from said housing and deflecting means by manipulation from the exterior of the apparatus.

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