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SHIELD FOR SOOT BLOWERS

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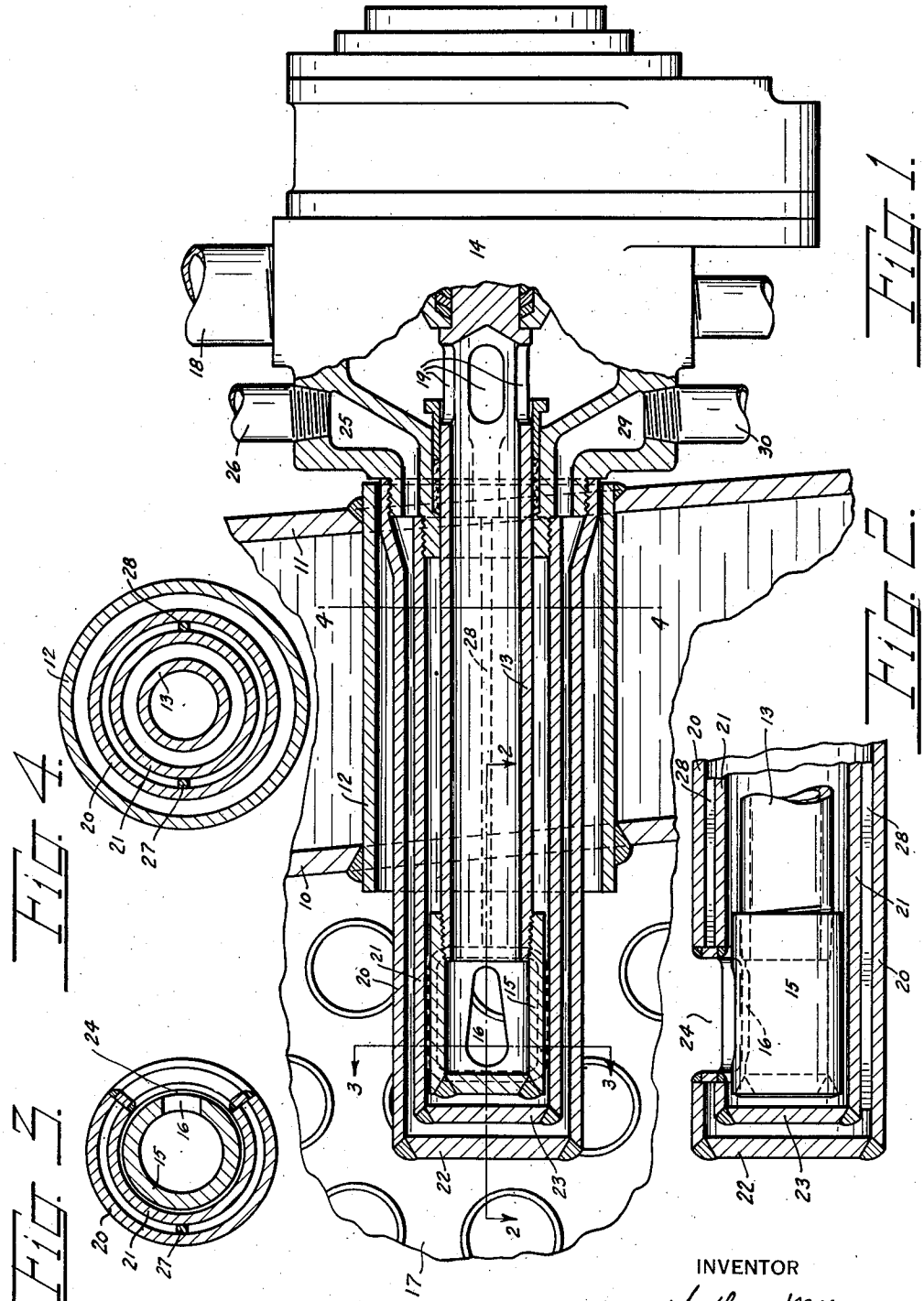


Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

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SHIELD FOR SOOT BLOWERS

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4 Claims. (Cl. 122—391)

The present invention relates to soot blowers and particularly to improvements in soot blowers for fire tube boilers of the type employed on locomotives.

A type of soot blower has been developed for use with locomotive boilers consisting essentially of an operating unit mounted on the side of the locomotive boiler and provided with a nozzle pipe projecting through the side sheets of the combustion chamber of the boiler and having a nozzle tip facing the flue sheet of the boiler so that a stream of cleaning fluid, such as steam, may be directed over the surfaces of the flue sheet as the nozzle tip is oscillated. However, it has been found that because of the exceedingly high temperatures existing in the combustion chamber the nozzle tips require frequent replacement, although they may be made of heat resisting alloys.

The object of the present invention is to provide means for protecting the nozzle tip of such a soot blower so as to eliminate or minimize the necessity for its replacement. The invention will be best understood upon consideration of the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawing in which:

Fig. 1 is an elevational view, partly in section, of a soot blower as applied to a locomotive type boiler and embodying the improvement constituting the present invention.

Fig. 2 is a sectional view in a horizontal plane through the nozzle tip and protective device as taken on the line 2—2 in Fig. 1, and

Figs. 3 and 4 are vertical sectional views on the lines 3—3 and 4—4 respectively in Fig. 1.

In most fire tube boilers of the locomotive type the fire box or combustion chamber is provided at each side thereof with a "water leg" defined by inner and outer side sheets such as those designated 10 and 11 respectively in Fig. 1. Extending between the side sheets 10 and 11, and properly sealed in apertures in these sheets, is a tube 12 through which the nozzle pipe 13 of a soot blower designated 14 projects so that the nozzle 15 may be located with its aperture 16 in a position to face the flue sheet 17 of the boiler. Briefly described, the soot blower 14 consists of a steam turbine operating suitable mechanism for oscillating the nozzle pipe 13 having the nozzle tip 15 at its end so that a jet of steam supplied through the pipe 18 and entering the nozzle pipe 14 may be directed through the nozzle aperture 16 to sweep over the flue sheet 17 to remove soot therefrom.

In accordance with the present invention the nozzle pipe 13 and nozzle tip 15 are surrounded by a hollow jacket consisting of a pair of spaced concentric tubes 20, 21 closed at the inner ends adjacent the nozzle by members 22 and 23, respectively. Both the outer and inner tubes 20, 21 are formed with alined apertures forming an orifice 24 opposite the nozzle tip 15 so that a jet of cleaning fluid from the latter may be projected through the jacket against the flue sheet of a boiler. The orifice 24 in the jacket extends circumferentially thereof to an extent at least equal to the arc of movement of the nozzle tip 15 so that the jet of cleaning fluid may sweep over an area of the flue sheet corresponding to the arcuate movement of the nozzle. As shown in Figs. 2 and 3 the space between the tubes 20 and 21 and around the edges of the openings provided therein to form the orifice 24 is closed (in any suitable manner) so that the annular space between the tubes is maintained closed at this point. The spacing of the tubes 20, 21 forms an annular space communicating at its outer end with a chamber 25 to which steam is admitted from the locomotive boiler through the pipe 26. Partitions 27 and 28 extending axially through the annular space between the tubes 20 and 21 at diametrically opposite points divide the annular space into a steam inlet chamber located at the upper portion of the assembly as seen in Fig. 4 and a steam outlet chamber at its lower portion. The partitions 27 and 28 terminate short of the inner ends of the tubes 20, 21 at points adjacent the nozzle 15 as may be seen in Fig. 2 so that the steam inlet chamber communicates in this region with the steam outlet chamber. The cooling steam is carried away from the outlet chamber through a pipe 30 leading to some auxiliary of the locomotive, such as the turbo-generator or other apparatus which, preferably, is in continuous operation.

It is customary to operate the soot blower by admitting steam through the pipe 18 at the beginning and at the end of the run of the locomotive and at certain other times such as when the locomotive is drifting, these operations being carried out for the purpose of maintaining the flue sheet 17 as free as possible from accumulations of soot. With the improvement of the present invention applied to such a soot blower the nozzle pipe, and particularly the nozzle 15, are continuously protected from the high temperatures in the firebox and combustion chamber since they are enclosed within a jacket through which a cooling fluid is continuously cir-

culated. As a result the necessity for replacing the nozzle tip is eliminated, or, at least, the frequency with which such replacements must be made is substantially lessened.

What I claim is:

1. In combination with a soot blower having an oscillatable nozzle pipe provided at one end with a nozzle tip facing the gas contacted heat transfer surface of a fluid heater; a pair of concentric tubes surrounding said nozzle pipe and nozzle and formed with alined openings opposite the location of said nozzle to permit the projection of a jet of cleaning fluid therefrom against the gas contacted surface of the heater; means closing the space between said tubes about said openings therein; means closing the ends of said tubes adjacent said nozzle; partition means dividing the annular space between said tubes into inlet and outlet chambers so arranged that said chambers communicate adjacent the nozzle; and means for admitting a cooling fluid to said inlet chamber and taking it away from said outlet chamber.

2. In combination with a soot blower having an oscillatable nozzle pipe provided at one end with a nozzle tip facing the gas contacted heat transfer surface of a fluid heater; a pair of concentric tubes surrounding said nozzle and formed with openings opposite the nozzle tip through which a jet of cleaning fluid may be projected from said nozzle tip against the gas contacted surface of the heater, said tubes being spaced to form an annular space therebetween; closure means for each of said tubes located at the ends thereof adjacent said nozzle tip; means closing the space between said tubes about said openings therein; partition means extending from the opposite end of said tubes and terminating short of the closure means for the larger of said tubes and acting to divide said annular space into inlet and outlet chambers which communicate; and means for supplying a cooling fluid to said inlet chamber and for withdrawing it from said outlet chamber.

3. In combination with a soot blower having an oscillatable nozzle pipe provided at one end with a nozzle tip facing the gas contacted heat transfer surface of a fluid heater; a hollow jacket surrounding said nozzle pipe and nozzle comprising a pair of concentric tubes each closed at the end adjacent said nozzle and formed with alined openings in their side walls opposite the location of said nozzle to permit a jet of cleaning fluid to be projected therefrom against gas contacted surface of the heater; means closing the space between said tubes about the edges of said openings; means dividing the annular space between said tubes into a fluid inlet chamber and a fluid outlet chamber so arranged that said chambers communicate at the ends adjacent said nozzle; and means for circulating a cooling fluid through said chambers to protect said nozzle from high temperatures in said combustion chamber.

4. In combination with a soot blower having a nozzle pipe provided at one end with an apertured oscillatable nozzle tip facing the gas contacted heat transfer surfaces in a fluid heater; means for oscillating said nozzle tip through a determined arc; a hollow stationary jacket surrounding said nozzle pipe and nozzle, said jacket being formed opposite the aperture of said nozzle tip with an opening corresponding in circumferential extent, at least, to the arc of movement of said nozzle tip so that a jet of cleaning fluid may be projected through said aperture from said nozzle tip over an area of said gas contacted surface of the heater corresponding to the sweep of said nozzle tip; and means for circulating a cooling fluid through said jacket to protect said nozzle against high temperatures in said heater.

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