SUMMARY OF THE INVENTION

[0011] Embodiments of tThe present invention areis directed to a spray desuperheater. More particularly, embodiments of the invention seek to provides a new and improved spray tube assembly which may having a plurality of nozzles, whereby liquid coolant may be controllably injected into a gas or a superheated fluid, typically steam, to selectively maintain the fluid at a predetermined temperature level.

[0012] In a possible embodiment of the present invention, a Mechanical Atomizing Desuperheater with Class V Shutoff (MADV) introduces liquid coolant into a superheated medium. The MADV is a probe style direct contact heat exchanger that combines a flow control element (trim) and a spray tube with spring-loaded injection nozzles. The flow control element modulates the coolant flow using a top guided plug-throttling trim, which is configured to provide the required flow control characteristics. The trim is comprised of two components, a top guided plug and a seat ring. The plug has a contour on its lower end, below the seat. The contoured portion of the plug defines flow characteristic, by varying flow area relative to the plug position. The plug is guided by replaceable guide insert that is press-fitted into the upper part of the MADV body. Throttling occurs between the contoured portion of the plug and the seat ring bore. The seat ring is mounted at the top of the spray tube.

[0013] Prior art Multi-nozzle spray desuperheaters and spring assisted multi-nozzle desuperheaters both have an internal flow control element, which is located at the highest temperature zone of the desuperheater. The resulting high thermal stresses and different thermal expansions of the internal parts create the potential for accelerated operational failures and/or premature wear of internal parts. An embodiment of tThe present invention resolves this problem by locating the trim outside of highest temperature zone. A series of injection nozzles are fitted to the end of the spray tube to complete the assembly and this assembly is inserted through the header connection. In addition, current embodiments have the MADV's nozzles also have a higher capacity and more robust design than the nozzles used in the multi-nozzle spray and spring assisted multi-nozzle desuperheaters. The

a coolant traversing through said valve. A spraying means to spray said liquid coolant with a spray nozzle into said gas or liquid conduit to perform desuperheating.

[0017a] According to a first aspect, there is provided a valve assembly for desuperheating a gas or a liquid having a longitudinal axis extending therethrough, comprising: a valve body having an inlet and an outlet, where a channel extends there between: an actuator connected to said valve body; wherein said actuator comprises a transversable actuator rod that extends into said channel of said valve body; a valve seat disposed proximate to said outlet within said channel; a plug disposed within said channel and attached to said transversable actuator rod, wherein said transversable actuator rod translates said plug within said channel; a spray tube coupled to the outlet of said valve; and at least one spray head affixed to said spray tube.

[0017b] According to a second aspect, there is provided a method for desuperheating a gas or a liquid utilizing a valve assembly, comprising: detecting a temperature of said gas or liquid to be desuperheated; sending said detected temperature to a controller; sending a control signal to a valve actuator coupled to a valve, wherein said valve comprises: a valve body having an inlet and an outlet, where a channel extends there between: a valve seat disposed proximate to said outlet within said channel; and a plug disposed within said channel and attached to a transversable actuator rod, wherein said transversable actuator rod translates said plug within said channel; and positioning said plug proximate to the valve seat in response to the signal.

[0017c] According to a third aspect, there is provided a system for desuperheating a gas or a liquid utilizing a valve assembly, comprising: means for detecting a temperature of steam in a steam pipe; means for sending said temperature to a controller; means for controlling a control signal to a valve actuator coupled to a plug inside a valve; means for positioning said plug proximate to a valve seat inside said valve to increase or decrease a flow rate of a cooling traversing through said valve; and means for spraying said liquid coolant with a spray nozzle into said stream pipe.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. 1 is a schematic view of a steam line incorporating of a prior art desuperheater apparatus.

[0019] FIG. 2 illustrates a cross sectional view of an embodiment of a desuperheater apparatus in accordance with the present invention.

[0020] FIG. 2a illustrates may be an example of the composition on the injection nozzle of a desuperheater apparatus in accordance with the present invention.

[0021] FIG 3. is an enlarged view of the desuperheater apparatus of the present invention in the closed position.

[0022] FIG. 4 is a side view of a plug employed in the valve of a desuperheater apparatus of the present invention.

[0023] FIG. 5 is a cross sectional view showing a valve in the closed position in a desuperheater apparatus of the present invention.

[0024] FIG. 6 is a cross sectional view showing an example of a stuffing box utilized in an embodiment of the present invention.

[0025] FIG. 7 is a graph illustrating three types of flow control characteristics of the present invention during operation.