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NOZZLE ASSEMBLY

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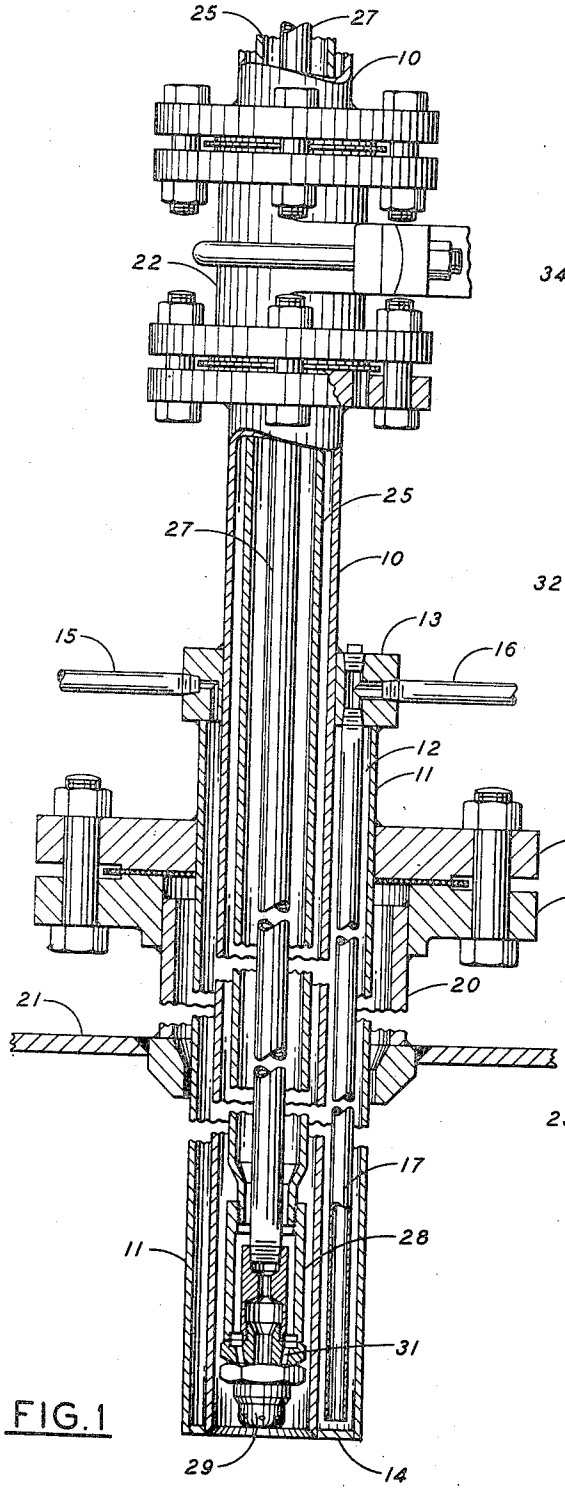

FIG. 1

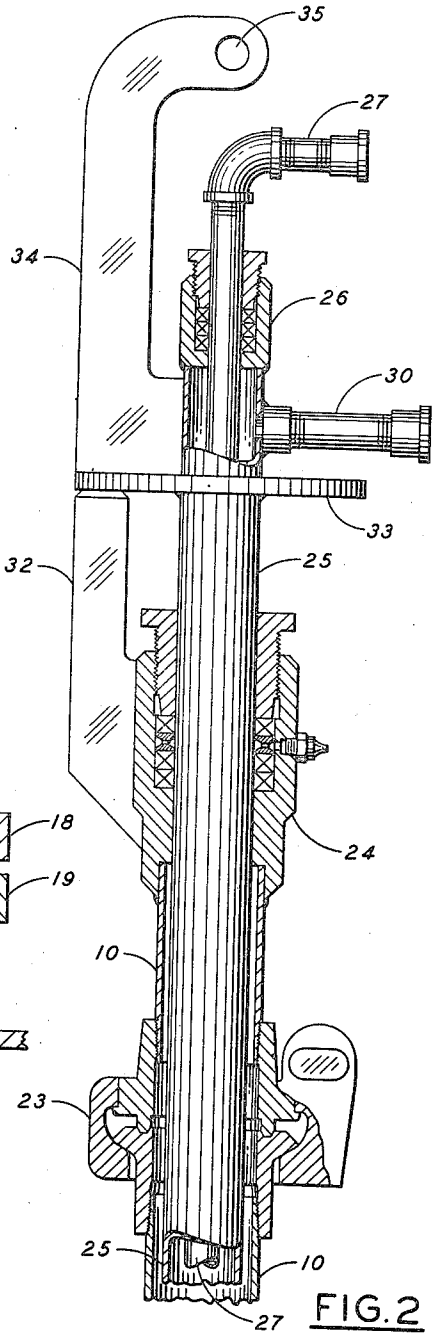

FIG. 2

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NOZZLE ASSEMBLY

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Application November 29, 1954, Serial No. 471,600

5 Claims. (Cl. 299—86)

This invention relates to nozzle constructions for introducing a liquid or a liquid and a gas into a closed vessel for modification of a condition or process taking place therein, and particularly refers to a selectively removable nozzle for introducing a liquid spray into a quench vessel for rapidly and controllably cooling a reacted gas or vapor therein, with provision for preventing deposits of undesired accumulations of condensed solids on the outer end and the support means for said nozzle structure.

The general procedure and apparatus for which this invention is particularly, but not necessarily adapted, is disclosed and claimed in the copending application for United States Letters Patent, Serial No. 471,602, filed November 29, 1954, and entitled "Spray Cooling Apparatus and Method," assigned to the common assignee herewith.

In the operation of quench vessels wherein vaporized streams containing substances which condense to solid form are treated, it has been troublesome to keep the cooling spray nozzles free from undesired solid accumulations. Inherently the nozzle structure offers the coolest surface on which the solids may condense, and it is only a matter of time until the unit must be shut down to clear the tip of the nozzle from the encrusting solids so that the desired spray configuration may be produced. Interrupting the continuity of the quenching process to clean the nozzle is highly undesirable, and this should be minimized.

This invention comprehends broadly a heated jacket arrangement that is substantially coextensive with the length of the nozzle and acts to keep the discharging tip as well as the body of the nozzle free of encrustations or accumulations of solids. Additionally it includes a desirable arrangement for selectively introducing or withdrawing the nozzle body without introduction or loss of pressure or fluids from the tank or vessel into which the nozzle projects.

It is an object of this invention to provide an improved form and arrangement of a cooling spray nozzle structure for closed vessels and particularly one which will not be adversely affected in operation by accumulations of solids thereon.

Another object is to provide a cooling or treating nozzle structure that is simply and easily installed or removed without affecting the pressure or causing fluid entry or loss from the vessel in which the nozzle is mounted.

These and other objects and advantages will be further apparent from the following description and the attached drawing, which forms a part of this specification and illustrates a preferred embodiment of the invention.

In the drawing, Figure 1 is a vertical sectional view of the lower portion of a preferred arrangement of a nozzle and heating jacket structure.

Figure 2 is a vertical and part sectional view of the upper portion of the arrangement shown in Figure 1.

Referring to the drawing, reference numeral **10** designates generally a tubular housing member or first conduit,

the lower portion of which is enclosed by a cylindrical jacket **11** or second conduit forming an annulus **12** which is closed at the top by a flange **13**, and at the bottom by an annular plate **14**. An inlet connection **15** for steam or other heating fluid communicates with the top of annulus **12** and an outlet connection **16** communicates with a drain pipe **17** extending downwardly to a point near the bottom of the annulus **12** to remove condensate or spent heating fluid from the jacket.

Near the upper end of jacket **11** there may be mounted a flange **18**, cooperating with a second flange **19** from which there depends a tubular guard or shield member **20**, which may be secured in any desired manner as by welding to the shell of the vessel **21** into which the nozzle elements, to be described below, are adapted to project. The tubular housing member of first conduit **10** extends upwardly above the flange **13** where it is provided with a gate valve **22**, and continues (Figure 2) upwardly to a separable coupler **23**, above which member **10** terminates in a stuffing box **24**.

Extending throughout tubular housing member **10**, in this example, is a third conduit member **25**, provided as its upper end with a stuffing box **26** through which projects an inner pipe or fourth conduit **27** carrying the cooling liquid to be sprayed. Pipe **27** extends substantially throughout third conduit **25** and is connected by sleeve **28** to a conventional nozzle tip **29** from which a divergent spray of liquid is projected to just graze the lower inner end of enclosing jacket **11**. If air or other gas under pressure is required for the desired atomization or distribution of the liquid, it is admitted through inlet connection **30**, at the upper end of third conduit **25** below stuffing box **26**, and passes downwardly in the annulus between pipe **27** and third conduit **25** to enter the nozzle tip **29** through passages **31**. Alternatively, if no pressurizing gas is required, fourth conduit **27** may be omitted and third conduit **25** may be used to convey only the cooling liquid to the atomizing spray tip **29**.

One of the features of the invention is the accurate positioning of the nozzle tip **29** to be substantially flush and within the lowest end of the heating jacket **11**, to receive head radiated therefrom which will prevent building up of solid deposits on that tip. One means for insuring this alignment is illustrated in Figure 2, and consists of an indexing gauge stop or bracket **32** extending upwardly from the top of the tubular housing member or first conduit **10**. To facilitate removal and insertion of third conduit **25**, which forms the retractable nozzle structure, a lifting hook **34** with a suitable hole **35** may extend upwardly above the end of that conduit.

The construction just described provides means for removably positioning the nozzle tip **29** at the lower end of third conduit **25** at the desired point within the heating jacket **11** formed by first and second conduits **10** and **11**, respectively, and, by lifting conduit **25** to a point where nozzle tip **29** is above gate valve **22**, the latter may be closed. Thereafter, separable coupler **23** may be disconnected and conduit member **25**, together with the upper end of conduit **10** carrying stuffing box **24** and its associated connections, may be completely separated from the lower end of first conduit **10** for renewal or maintenance, without loss of pressure or fluid from vessel **21** into which the jacket **11** projects. To replace the spray unit, the removal operation just described is reversed and coupler **23** is secured, whereupon valve **22** may be opened to permit further downward travel of the conduit **25** and nozzle tip **29** to the point determined by stop **32**.

Although a single arrangement of this invention has been described and illustrated, it is understood that changes and alterations could be made without departing from its essential features, and all such modifications that are

within the scope of the appended claims are intended to be covered thereby.

We claim:

1. A nozzle assembly for introducing fluid into a closed vessel, comprising a first conduit adapted to extend into said vessel, a second conduit enclosing a part of said first conduit and coextensive therewith inside of said vessel, means closing the ends of the space between said conduits to form a jacket adapted to receive a circulating heat-exchange fluid, inlet and outlet means communicating with said jacket for introducing and withdrawing said heat-exchange fluid, the outwardly extending portion of said first conduit being provided with a valve and a terminal packing gland, a third conduit adapted to extend through said packing gland and throughout said first conduit, a nozzle at the inner end of said third conduit, and means for introducing fluid into said third conduit, so constructed and arranged that the inner end of said third conduit may be withdrawn to a point outside of said valve, whereby the valve may be closed for further withdrawal of said third conduit and said nozzle without passage of fluid into or out of said vessel through said first conduit.

2. An assembly according to claim 1, with the addition of a fourth conduit extending throughout said third conduit, said nozzle communicating with both said third and said fourth conduits, and means for admitting a second fluid into the outer end of said fourth conduit to be mixed in said nozzle with fluid from said third conduit.

3. An assembly according to claim 1 with the addition of means for confining said nozzle within the inner end of said first and said second conduits.

4. An assembly according to claim 1, with the addition of a separable connector in said first conduit between said valve and said packing gland to permit the outermost end portion of said first conduit and said packing gland to remain upon said third conduit when the latter is withdrawn.

5. An assembly according to claim 1, with the addition of means extending throughout the space between said first and said second conduits for removing spent heat-exchange fluid from the outer end thereof.

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