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DIP PIPE FOR PROCESSING CONTAINERS

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This invention relates to dip pipes of the variety adapted for supplying materials such as gases, liquids, solids or the like to a processing container at a point adjacent the bottom or below the top surface of the contents of the container, or for withdrawing a portion of its contents below its top surface, as well understood in the art. Such dip pipes are frequently employed in connection with the processing of acid and alkaline materials of a highly corrosive nature and it has been a prior practice to make the dip pipe from a tubular steel pipe protected against corrosion by covering its walls, inside and out, with a fused enamel or glass coating such as commonly applied to the inner surfaces of processing containers of the character described. It has been found, however, that where such glass coating extends over the sharply curved corners between the outer and inner walls at the dipping end of the pipe, there is a tendency for the coating to become damaged by contacts with other surfaces, or to become weakened by the sharp curvatures and cracked or pitted, with resulting exposure and corrosion of the metal pipe and contamination of the processed materials.

One object of the invention, therefore, is to provide an improved dip pipe having a more durable and practical type of construction.

Another object, more specifically stated, is to provide a glass coated dip pipe of the nature indicated with simple, practical and efficient means for protecting its coated dipping end against injury of either type and resulting corrosion of the metal pipe.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a sectional elevation, partly broken away, of a processing container having applied thereto a dip pipe embodying the present invention and shown in vertical elevation;

Fig. 2 is an enlarged, sectional elevation of the dip pipe, partly broken away, and

Fig. 3 is an enlarged, fragmentary, sectional elevation of a portion of the lower end of the dip pipe shown in Fig. 2, to better illustrate its structural details.

The preferred embodiment of the invention, herein disclosed by way of illustration, is adapted for use with a processing container or tank, indicated generally at 10 (Fig. 1), having side walls 11, a lower end or head 12 and an upper

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head 13, the latter being formed with the usual nozzle 14 terminating in a flanged end 15 for the attachment of outlet connections. The sides and bottom of the container are enclosed by a spaced jacket 16 for applying heating or cooling media, as well understood in the art. The inner surfaces of such a container employed in processing corrosive substances, are commonly covered and protected by a fused glass coating (not shown) extending over the inner walls and the top surface of its flange 15, as well understood in the art. The present invention is herein disclosed in a form adapted for insertion through such a nozzle with its dipping end extending to the lower portion of the container for supplying or withdrawing materials as described.

The present embodiment of the invention comprises, preferably, a straight pipe 17 of cold drawn, seamless steel tubing and of a diameter and length suitable to the particular application. A pipe of this material has the advantages of economy and strength but is subject, of course, to attack by corrosive substances such as the acid or alkaline materials commonly employed in industrial processes. Consequently, it has been the practice to protect the pipe by fusing over its inner and outer walls a continuous enamel or glass coating 18 of the nature referred to as commonly applied to the inner surfaces of processing containers such as the tank 11. It has been found in practice, however, that where such glass coating passes around the sharply curved corners, as 19, between the outer and inner walls at the dipping extremity of the pipe, the coating is subject to chipping and injury by contact with other surfaces, as well as to weakening of the coating in fusing it around the sharply curved extremity of the pipe with a resulting tendency to become cracked and pitted, thus exposing the metal pipe to spreading corrosive attacks which injure the pipe and contaminate the materials being processed. It has been found that these weaknesses of such dip pipes may be overcome by the improved construction which will now be described.

In applying the present invention, the outer surface of the pipe is ground away to reduce its outer diameter over a portion 20 extending upwardly from the end of the pipe by a distance of, say, 1½ inches, the diameter being reduced by an amount of, say, ⅛ of an inch, sufficient to compensate for the combined thickness of a layer of cement and a protective metal sleeve hereafter described. Such reduction in diameter is accomplished prior to the application of the

glass coating 18 so that the glass coating extends continuously over such reduced surface, as shown in Fig. 3.

A layer of corrosion-resisting cement 21, such as the known resin or silicate cement, is applied over the glass coating around the end and adjacent portions of the inner and outer side walls of the pipe extending to the same height as the area of reduced diameter described above. This cement layer serves as a protection for the glass coating and also for attaching a protective metal ferrule 22, which will now be described.

The ferrule 22 is preferably made by drawing a thin sheet of corrosion-resisting metal, such as tantalum, having a thickness, for example, of $\frac{1}{64}$ of an inch, into the form of spaced, concentric, inner and outer sleeves, 23 and 24, respectively, extending continuously around the end of the pipe and up the inner and outer side walls as high as the cemented reduced portion of the pipe described above and as shown in the drawings. This double wall ferrule is adhesively secured to the glass coated surfaces of the pipe by the cement layer 21 described above, which seals the space between the ferrule and glass coating and further protects the latter. As shown, the described reduction in the outer diameter of the pipe compensates for the addition of the combined thicknesses of the outer cement layer and the outer ferrule sleeve 24 so that the overall diameter of these parts is no greater than the outer diameter of the glass coated pipe above the ferrule, thus preventing any interference with the insertion of the pipe through gasket or other means for sealing its upper end to a container nozzle.

By such means the dipping end of the pipe and its glass coating are efficiently shielded and protected against impacts or abrasions tending to injure the coating, as well as against the penetration of corrosive substances into any cracks or pits which may develop in the coating at the end of the pipe. The ferrule 22 thus provides metallic protection for the enamel or glass coating which, in turn, protects the steel pipe 17. The ferrule is adapted to be economically manufactured and cemented to the reduced coated end of the pipe and provides it with durable and effective protection against injuries such as described, over long periods of use.

The opposite or upper end of the pipe is preferably equipped with a welded-on attaching flange 25 formed with bolt openings 26 by means of which the pipe may be secured to the flange 15 of the tank nozzle 14, as by bolting it to the halves of a split collar 27 detachably engaged with the under side of the nozzle flange, as shown. This extremity of the pipe has welded thereto also an attaching flange 28 for connecting it with an outlet or supply line, as well understood in the art. The glass coating is preferably extended over the under side of the flange 25 and the upper side of the flange 28.

While particular materials and dimensions

have been referred to in the above description of one preferred embodiment of the invention, it will be readily apparent to those skilled in the art that such materials, dimensions, proportions and details of construction are capable of wide variation to suit the conditions of particular adaptations to which the invention may be applied.

It will thus be seen that the invention accomplishes its objects and while it has been herein disclosed by reference to the details of a preferred embodiment, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

I claim:

1. A dip pipe for supplying materials to and withdrawing the same from a container below the upper surface of the contents thereof comprising a metal pipe, a corrosion-resisting glass coating covering the inner and outer surfaces of said pipe and a ferrule of corrosion-resisting metal covering said coating at the dipping end and over the adjacent side wall portions of said coated pipe to shield and protect the same.

2. A dip pipe as specified in claim 1 in which said ferrule is adhesively secured and sealed to said pipe coating by an interposed layer of corrosion-resisting cement.

3. A dip pipe as specified in claim 1 in which said ferrule comprises a thin sheet of corrosion-resisting metal formed into spaced, concentric, inner and outer sleeves extending continuously around the dipping end of said pipe and over said adjacent side wall portions to shield and protect the same.

4. A dip pipe as specified in claim 3 in which said ferrule sleeves are adhesively secured and sealed to said pipe coating by an interposed layer of corrosion-resisting cement.

5. A dip pipe as specified in claim 4 in which said metal pipe has its dipping end reduced in outside diameter by an amount substantially equal to the thickness of said cement layer and sleeve to maintain a substantially uniform overall diameter for said dip pipe.

6. A dip pipe as specified in claim 4 in which the outer end of said dip pipe is provided with a flange for attaching the same to the nozzle of a container and with a flanged end for connection with an outlet conduit.

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