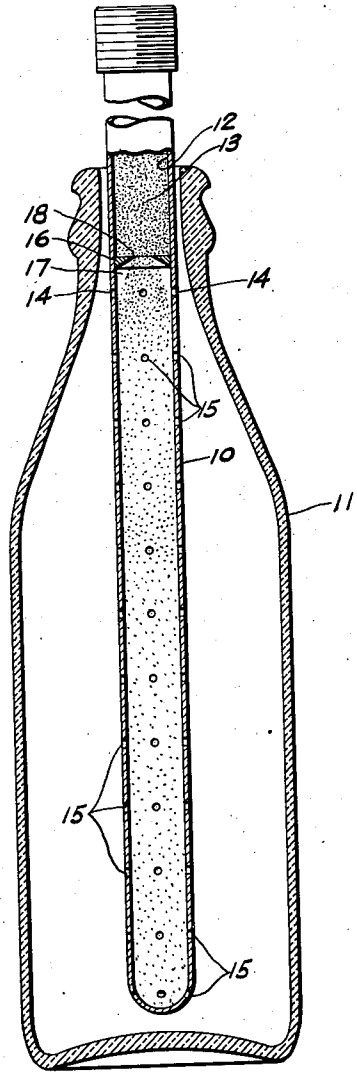
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METHOD OF COOLING THE INTERNAL SURFACE OF BOTTLES, JARS OR OTHER HOLLOW GLASS ARTICLES

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METHOD OF COOLING THE INTERNAL SURFACE OF A BOTTLE, JAR, OR OTHER HOLLOW GLASS ARTICLE

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3 Claims. (Cl. 49—89)

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This invention relates to improvements in methods of discharging jets of cooling fluid within the interior of hollow glass articles, such as bottles, jars, etc. to cool or chill the inner surfaces of such articles, as in tempering.

An object of the invention is to provide a practical method of cooling the internal surface of a bottle, jar or other article of hollow glassware by applying thereto distributed jets of cooling fluid, some of which have more moisture included therein and higher cooling characteristics than the others.

The method of the present invention may be performed by use of a nozzle to apply jets of liquid spray carrying air or other gas under pressure to the internal surface of a bottle, jar or other hollow glass article to chill such surface suitably for tempering of the article. The cooling effect or characteristics of the jets of fluid passing from the interior of the hollow body of the nozzle through the jet holes will vary within limits with the amounts of a liquid, such as water, carried in spray form by the air of the jets. I therefore propose, according to the invention, to provide a nozzle which will have means at the interior of the nozzle body for robbing the jet or jets which are intended to have a relatively lower cooling effect than the others of part of the liquid which otherwise would be included in such jet or jets. A nozzle constructed to accomplish this objective may have an inwardly projecting flashing strip, shield or baffle member on the inner wall of the nozzle body at the upstream side of the jet hole or holes through which will pass the jet or jets which are to have a relatively reduced cooling effect.

Some of the liquid component of the gaseous fluid-liquid spray coolant supplied to the nozzle may form a downwardly moving film on the inner wall of the nozzle body. An object of the present invention is to effect re-atomization within the nozzle body of the downwardly flowing film of liquid on the inner wall of such body. The inwardly projecting flashing strip, shield or baffle on the inner wall of the nozzle body may be used to attain this object, the downwardly flowing film of liquid on the inner wall of the nozzle body being required to flow over the inner edge of such flashing strip, shield or baffle where such liquid may be torn loose from its flow surface and broken up or re-atomized by the downwardly moving air or gaseous fluid at the interior of the hollow body. The flashing strip, shield or baffle thus may have a dual function. It may extend completely around the inner periphery of the

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nozzle body and may have a relatively sharp inner edge to promote re-atomization of the liquid film flowing thereto or intercepted thereby. A plurality of these re-atomizing members on the inner wall of the nozzle body may be provided and respectively located at predetermined places along the length of such body. The extent of inward projection from the inner wall of the nozzle body of such re-atomizing member or members may be predetermined in relation to distance therefrom of the nearest jet hole or jet holes down-stream therefrom so that the jet-hole shielding effect of each such re-atomizing member may be varied from a practically negligible or zero effect to a substantial effect as desired and as service conditions may require in any particular operating installation. A plurality of the re-atomizing edges projecting into the downwardly moving stream or streams of coolant in the nozzle body at different levels therein may be provided in any other suitable way.

Other objects and advantages of the invention will hereinafter be pointed out or will become apparent from the following description of a practical embodiment of the invention as shown in the accompanying drawing, in which:

The view is a longitudinal vertical section of a portion of a nozzle in position for use to cool the interior of a bottle in accordance with the invention.

The nozzle shown in the drawing has an elongate hollow body **10** adapted to project into the interior of a hollow glass article **11**, the internal surface of which is to be cooled, as through a tempering temperature range in a tempering operation or for any other useful purpose. The nozzle body may be closed at the end thereof that is within the glass article, this being the lower end of such body when it is in the position shown in the drawing. The opposite, in this case the upper, end portion of the nozzle is not shown since it may have any suitable known form and construction which will enable it to be suitably supported and operated in any known way and by known means and its bore or internal passage **12** supplied with a cooling fluid, indicated by the stippling **13**. This cooling fluid may comprise compressed air or other suitable gas under pressure carrying atomized fine particles or spray of a suitable liquid, for example, water.

The nozzle body is provided with jet holes suitable in number, size or sizes, individual locations in the wall of the hollow nozzle body, etc., to provide for discharge of jets of the cooling fluid from the interior of the nozzle body toward the

internal surface of the glass article at the places and in the amounts deemed appropriate for the tempering or other glass cooling operation. In the nozzle shown, the jet holes are arranged in two longitudinally extending series at opposite sides of the nozzle body. A nozzle having jet holes thus located preferably should be rotated about its longitudinal axis in relation to the glass article to be tempered or a relative rotation between the glass article and the nozzle about the longitudinal axis of the latter should be effected in any suitable known manner. In the absence of such relative rotation, the nozzle body probably would be provided with more jet holes and such holes would be more widely distributed circumferentially of the nozzle body. The jet holes may be of any suitable contour or contours. For the use of a cooling fluid of the liquid spray type, jet holes as disclosed in my co-pending application, Serial No. 445,910, filed June 5, 1942, now abandoned, may be employed.

For the purpose of pointing out novel features of the present invention is illustrated in the drawing, the jet holes of the nozzle body 10 may be divided into two functionally different groups. The jet holes of the first group designated 14, are those for discharging jets of cooling fluid of relatively reduced moisture content and cooling characteristics. The second group comprises the remaining jet holes which are designated 15. The individual jet holes of each group and the respective jet holes of the two groups may be alike or different in size, shape or other physical characteristic. The jet holes 14 are for discharge of jets of cooling fluid which have been robbed of some of the moisture content of the cooling fluid as supplied to the jet holes 15. The jet holes 14 in the example shown are all located at the same level. It thus is feasible to shield all of them partially by providing an internal flange, flashing strip or annular fin 16 on the inner wall of the nozzle body at the upstream side of the jet holes 14. This may be secured in place either permanently or removably in any suitable known way. In the example shown, the member 16 will constrict or reduce locally the cross-section of the downwardly moving stream of cooling fluid in the bore of the nozzle and will provide beneath itself an annular zone 17 extending to and preferably somewhat below the jet holes 14. Fluid passing through this zone to the jet holes 14 will consist mostly of the air or other gaseous component of the cooling fluid. The member 16 will shut off direct passage of moisture to the jet holes either by downward flow of liquid on the inner wall of the nozzle body or in the downwardly moving currents of the cooling fluid next to such wall. The member 16 may have a relatively short inner edge projecting into the stream of cooling fluid as indicated at 18, to promote re-atomization of liquid intercepted by the member 16 and flowing thereonto from the portion of the inner wall of the nozzle body immediately thereabove.

In the operation of the structure shown, the jets emerging from the holes 14 will have reduced cooling characteristics as compared with the jets from the holes 15. The jet holes 14, each provided with a moisture robbing shield or partial baffle at the upstream side thereof, may be located to provide jets of lower cooling effect or characteristics wherever such jets are desired

in the cooling of the internal surface of a hollow glass article. In the example shown, the jets from the holes 14 may be applied to the internal surface of the neck portion of the article where they are desired to promote emigration of liquid from the interior of the article and to aid the cooling action on this portion of the article of the fluid escaping from the lower part of such article.

It will be understood that individual shields may be provided for each of the jet holes 14, whether such holes are located at the same level or at different levels in the wall of the nozzle body and that each such shield may extend only part of the distance around the inner periphery of the nozzle body. It also will be understood that inwardly projecting members of annular or other suitable configuration and provided with liquid re-atomizing edges may be provided on the inner wall of the nozzle body wherever they are deemed to be advantageous or necessary either for their re-atomizing action or for their jet-hole shielding action or for both these actions or functions. Many modifications of the particular illustrative example of the invention shown in the drawing and hereinbefore described will readily occur to those skilled in the art.

I claim:

1. The method of cooling the internal surface of a bottle, jar or other hollow glass article, as in tempering, which comprises applying distributed cooling jets thereto such that the fluid of the jets applied to one portion of said internal surface has less moisture content and cooling effect than the fluid of the jets applied to a different portion of said surface.

2. The method of cooling the internal surface of a bottle, jar, or other hollow glass article which comprises introducing jets of a gaseous fluid-liquid spray mixture into a part of the hollow glass article and a jet of a generally similar mixture of less liquid spray content into another part of said article.

3. The method of cooling the internal surface of a bottle, jar or other hollow glass article, which comprises reducing the liquid spray content of part of a stream of gaseous fluid-liquid spray in a hollow nozzle body projecting into the article to be cooled and passing the resultant product through jet holes in the wall of said nozzle body against the internal surface of a portion of the article and passing another part of the stream of greater liquid spray content through other jet holes in said nozzle body against the internal surface of another portion of said article.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
846,211	Johnson	Mar. 5, 1907
1,026,815	Matteson	May 21, 1912
1,441,982	Heylman et al.	Jan. 9, 1923
2,180,737	Hess	Nov. 21, 1939
2,269,060	Mitford	Jan. 6, 1942
2,275,155	Mongan, Jr.	Mar. 3, 1942
2,302,078	Wadman	Nov. 17, 1942
2,321,555	Mongan, Jr.	June 8, 1943
2,347,116	Littleton et al.	Apr. 18, 1944