This invention relates to processes of chromizing in which ferrous articles to be chromized are embedded in a powdered processing mixture in a refractory container and subjected to heat treatment at relatively high temperatures. More specifically, this invention relates to containers for the articles or parts to be chromized and sealing devices for expelling and excluding oxygen from the heat treating chamber.

In chromizing or similar processes it is essential that the seals for the container be of such character that accumulated gases will be afforded free escape from the container during the build up of the processing heat, but will thereafter effectively prevent the entrance of oxygen into the container and its contents.

Heretofore, containers for articles to be subjected to chromizing treatment have been of the single walled type in which oxygen might enter through undiscovered perforations in the wall, or have been provided with a single layer of sealing material through which oxygen could enter the container when a defect or porosity occurred in the seal. Moreover, the sealing material used in the seal has been of a character which frequently fuses under the heat treating temperatures, thereby permitting the then liquified sealing material to escape into the contents of the container, and thus destroying the effectiveness of the process.

One of the principal objects of the present invention is to provide a container for a chromizing process having a double wall to provide additional security against the admission of oxygen into the container in the event of perforations appearing in one of the walls, from any cause.

Another, and important, object of the invention is to provide a container for a chromizing process in which a plurality of seals is provided, to the end that if one seal develops defects, the remaining intact seals will preclude leakage of air into the container.

A further object of this invention is to provide a material in powdered form for the multiple seals of the container, which will remain in powdered form until the processing temperature is reached when it will not liquify and will be fused into a solid mass which thereafter will effectively prevent escape of gases from, as well as the admission of air into the container. After the latter has been removed from the heat treating oven or furnace, the sealing material will freeze into rigid, solid seals.

The container and its contents can then be allowed to cool to the temperature desired for removal of the articles or parts being treated. This is accomplished by breaking the seals and disassembling the container.

A still further object of the invention is to provide an additional seal in powdered form between the inner casing, or actual container of the articles to be chromized and the processing mixture therefor, and the cover for the container in which the material comprising the seal will remain in powdered form during the entire chromizing process, absorb any oxygen that may leak through the wall of the outer casing, and admit only nitrogen, which is not harmful to the heat treating process.

Other objects and advantages of the invention will be apparent from the following specification and the accompanying drawings forming a part hereof in which:

Fig. 1 is a sectional view of my improved container;
Fig. 2 is an enlarged sectional view, showing the multiple seal arrangement around the cover of the container; and
Fig. 3 is an enlarged sectional view showing the seal at the bottom of the container.

Referring to the drawings in which like numerals indicate like parts in the several views, my improved container comprises four separate parts including an inner casing 10, an outer casing 12, a supporting tray 14, and a cover 16 for the inner casing, all of which are made of any suitable heat resisting material.

The tray 14 is provided with an outer rim or surrounding wall 18 and an inwardly projecting integral flange 20 which extends all around the bottom of the tray some distance inwardly from the wall 18. The inner casing is open at its top and has a closed bottom 22.

The lid or cover 16 fits within the upper portion of the inner casing 10, and is downwardly offset from its edges thereby forming a continuous channel 24 between the cover and the ends and sides of the inner wall of the inner casing when the cover is in assembled position. This channel is for the purpose of containing sealing material 25, which preferably consists of approximately 50 pounds of kaolin powder and 50 pounds of aluminum metal powder; or approximately 45 pounds kaolin powder and fifty-five pounds of silicon metal powder. This particular seal remains in powdered form during the chromizing operation. The aluminum or silicon will absorb any oxygen which may leak through the wall of the outer casing, and admit only nitrogen which is not detrimental to the heat treating process.

Surrounding the bottom of the outer casing 12 and integral therewith is an outwardly projecting angular canopy 26, the bottom edge of which coincides with the bottom edge of the outer casing 12, thus forming a channel 27, the open end of which rests upon the bottom of the tray 14. This channel is of such width that when the outer casing is assembled over the inner casing 10 and in the tray 14, straddling the flange 20, the spaces 28 and 30 between the flange 20 and the walls of the channel and the space 32 between the walls of the inner and outer casings 10 and 12 will be substantially equal. The space 34, between the outer wall of the channel 26 and the rim 18 may be wider. The height of the flange 20 is preferably about one-half that of the top of the channel 26. The space 32, between the walls of the inner and outer casings continues entirely around the container.

To form the bottom seal the spaces 28, 30, 32 and 34 are filled to a level above the flange 20 with material 36 consisting of 50 pounds kaolin powder and 50 pounds vitreous enamel powder; or approximately 48 pounds of powdered glass and 52 pounds of kaolin powder. This material remains in powdered condition, so that it will permit the escape of gases from the inner casing 10, un-til the minimum processing temperature, approximately 800° C., is reached in the casing, at which time the material 36 will be fused into a solid mass, but not liquified. Then when the container is removed from the oven or furnace, the material 36 will freeze and provide four rigid seals against both the escape of gases from the casing 10, and the admission of oxygen into the casing.

After the articles A under heat treatment are sufficiently cooled, the sealing material 36 may be broken up and the container disassembled.

From the foregoing description it will be seen that I have provided a container for chromizing or similar heat...
treating processes in which the escape of gases from the heating chamber is freely permitted until the processing temperature is reached, and in which effective means are provided for excluding oxygen from the treating chamber after container is removed from the heating oven. Moreover, effective safeguards are provided to prevent leakage of oxygen through a perforation in the container into the heating chamber, as well as means to absorb any oxygen which might leak through a wall perforation.

Obviously, various changes in the construction and shape and also in the specific sealing materials, may be made within the spirit and scope of my invention. Therefore, it should be understood that the embodiment of my invention shown and described is intended to be illustrative only, and not limited thereto.

I claim:

1. A container of the character described constructed of heat resisting material adapted to withstand an elevated processing temperature comprising in combination, a tray having an outer wall and a bottom, an inner casing open at its top and resting with its bottom in said tray, a cover fitting within said inner casing, said cover being downwardly offset around its edges, thereby forming a continuous upper channel between said cover and the wall of said casing, said channel being filled with a powdered sealing material comprising an inert refractory powder and an oxygen absorbing powdered metal, an outer casing open at its bottom and resting over said inner casing in said tray, said outer casing having an integral outwardly projecting canopy, the bottom edge of which coincides with the bottom edge of said outer casing and rests upon the bottom of said tray, said canopy forming a continuous lower channel surrounding said outer casing and facing the bottom of said tray; and a layer of powdered sealing material in said tray filling all the space up to a predetermined level between the outer wall of said tray and the wall of said inner casing.

2. A container as claimed in claim 1, in which the sealing material in the channel between the cover and the wall of the inner casing is insufusible at the processing temperature applied to said container, but will remain in powdered form and permit the escape therethrough of gases.

3. A container as claimed in claim 1, in which the sealing material in the lower channel is of a character which will remain in powdered form and permit the escape therethrough of gases until the processing temperature is reached when it will fuse into a mass free from liquification.

4. A container as claimed in claim 1, in which the upper sealing material consists of approximately 50 parts by weight of kaolin powder and 50 parts by weight of aluminum powder.

5. A container as claimed in claim 1, in which the upper sealing material consists of approximately 45 parts by weight of kaolin powder and fifty-five parts by weight of vitreous metal powder.

6. A container as claimed in claim 1, in which the lower sealing material consists of approximately 50 parts by weight of kaolin powder and 50 parts by weight of vitreous enamel powder.

7. A container as claimed in claim 1, in which the lower sealing material consists of approximately 48 parts by weight of powdered glass and 52 parts by weight of kaolin powder.

8. A container as claimed in claim 1, in which the bottom of said tray is provided with a continuous integral and vertically arranged flange positioned within said lower channel and extending to a plane below the top of said sealing material.

9. A container as claimed in claim 1, in which a substantial space is provided between the walls of said inner and outer casings and between the outer wall of said lower channel and the wall of said tray.

10. A container as claimed in claim 1, in which the sealing material in the channel between the cover and the wall of the inner casing in insufusible at the processing temperature applied to said container, but will remain in powdered form and permit the escape therethrough of gases, and the sealing material in the lower channel is of a character which will remain in powdered form and permit the escape therethrough of gases until the processing temperature is reached when it will fuse into a mass free from liquification.

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