United States Patent

[11] 3,587,149

[72] Inventors **Erwin Schumann**
Rossdorf;
Rudolf Kuhn, Koppern, Germany

[21] Appl. No. **850,838**
[22] Filed **Aug. 18, 1969**
[45] Patented **June 28, 1971**

[73] Assignee **Deutsche Gold-Und Silber-Scheideanstalt**
Varmals Roessler, Frankfurt (main),
Germany

[32] Priority **Aug. 27, 1968**
[33] **Germany**
[31] **P 17 96 078.0**

[54] **FURNACE INSTALLATION FOR CONTINUOUSLY DESCALING A METAL BAND**
5 Claims, 1 Drawing Fig.

[52] **U.S. Cl.** **29/81, 266/3**

[51] **Int. Cl.** **B21c 43/04**
[50] **Field of Search** ..... 29/81 (R), (Inquired), 81 (C); 72/39; 266/3, 4 (A)(Inquired)

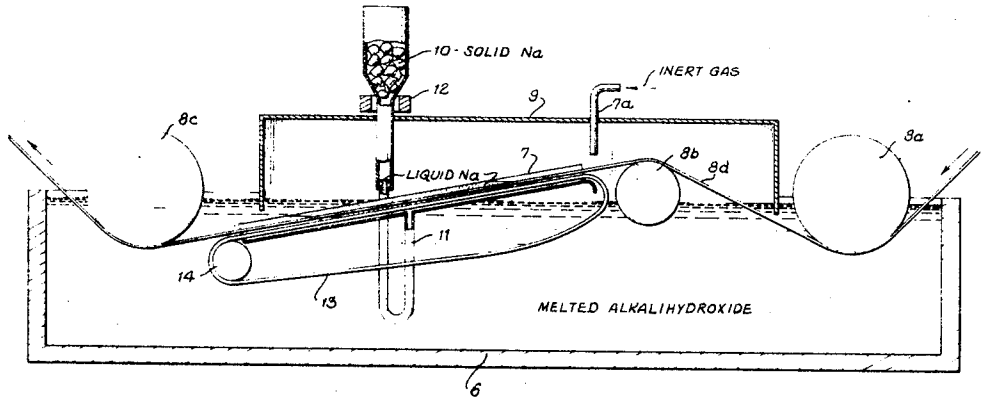
[56] **References Cited**

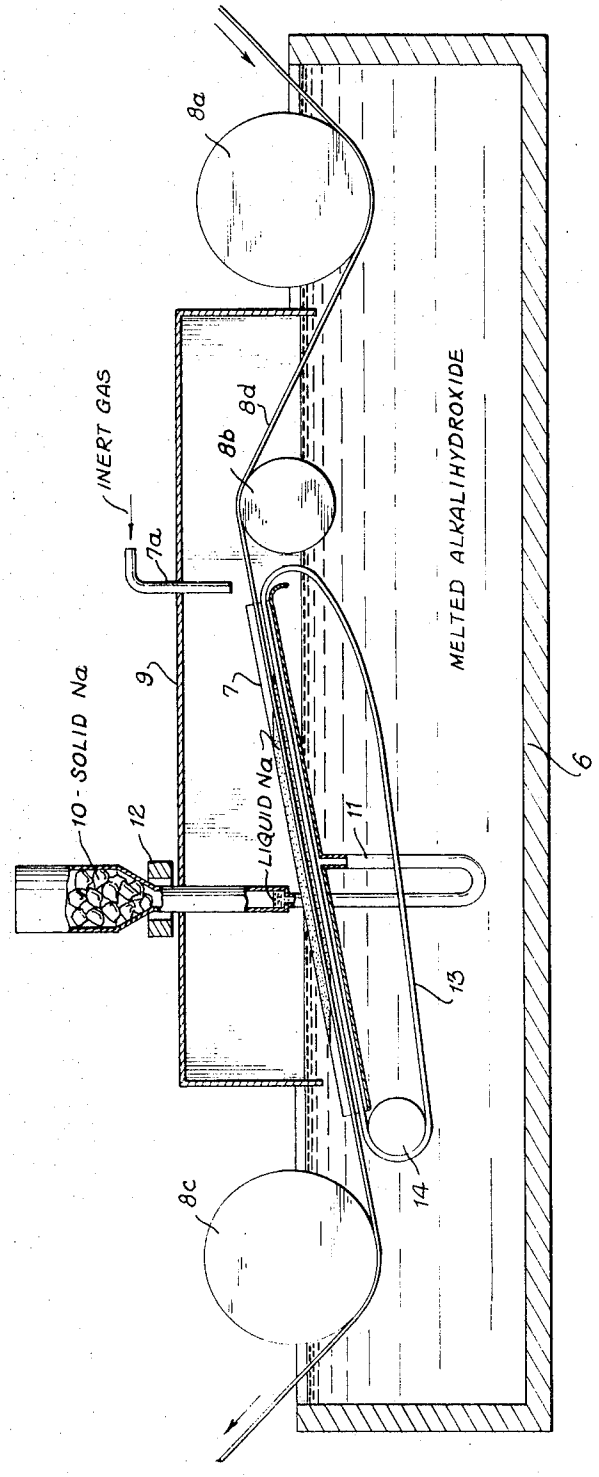
UNITED STATES PATENTS

1,930,601	10/1933	Townsend	266/4AUX
2,141,382	12/1938	Ferm	266/3
2,338,165	1/1944	Caugherty	28/81C
3,182,982	5/1965	Ruff	266/3
3,451,840	6/1969	Hough	29/81C

Primary Examiner—Alfred R. Guest
Attorneys—Francis D. Stephens and Hugo Huettig, Jr.

ABSTRACT: A trough is inclined in a tank of melted alkali-hydroxide and has its upper inlet end above the alkali-hydroxide. A metal band is descaled by being pulled through molten sodium contained in the trough.





INVENTORS

Erwin Schumann
Rudolf Kuhn

FURNACE INSTALLATION FOR CONTINUOUSLY DESCALING A METAL BAND

This invention relates to a furnace installation for the descaling of endless metal bands in molten sodium with the band running through melted alkali-hydroxide before and after being passed through the molten sodium.

This installation has the advantage in that only relatively small amounts of molten sodium are necessary and rolls or cylinders for guiding the metal band through the molten sodium are not necessary.

In this invention, the furnace installation comprises a heated tank containing melted alkali-hydroxide in which a sodium-containing pipe or channel is inserted in such a manner that the metal band is immersed in the molten sodium as it is pulled through the molten sodium by means of guiding rollers so that the metal band leaving the molten sodium is submerged in the melted alkali-hydroxide. The line of intersection between the molten sodium and the surface of the melted alkali-hydroxide passes through the molten sodium.

The means by which the objects of this invention are obtained are described more fully with reference to the accompanying schematic drawing which is a cross-sectional view through the furnace installation of this invention.

The furnace installation is composed of a heated tank **6** containing the melted alkali-hydroxide, a channel-shaped trough **7**, rollers **8***a*, **8***b* and **8***c* for guiding the metal band **8***d*, a protective gas hood **9**, a sodium storage container **10** connected to a pipe **11**, a heating apparatus **12** associated with container **10**, a segmented wire mesh band or ribbon **13** and a driving roller **14** for band **13**.

The molten sodium, during the operation of the installation, is contained in trough **7**. The trough is inclined so that its inlet end lies above the molten alkali-hydroxide while its lower outlet is submerged in the alkali-hydroxide. The metal band **8***d* guided by rollers **8***b* and **8***c* is pulled through the trough while being immersed in the molten sodium and leaves trough **7** while being submerged in the melted alkali-hydroxide. The molten sodium floats on top of the melted alkali-hydroxide because of its lower specific weight. The installation is designed so that the intersecting line between the surface of the alkali-hydroxide and the molten sodium lies within trough **7**. In order to protect the sodium from being oxidized by the air, a protective inert gas, such as nitrogen or argon, is introduced through pipe **7***a* into trough **7** at its upper inlet end where the metal band **8***d* enters the trough. In order to reduce the consumption of the inert gas, the hood **9** has the lower edges of its sides submerged in the melted alkali-hydroxide.

Molten sodium has to be fed or supplied to trough **7** in a continuous manner in order to maintain the molten sodium at a constant level. For doing such, solid sodium is supplied to container **10** and melted in the lower portion of container **10** by means of the heating apparatus **12**. The molten sodium flows by gravity though pipe **11** into trough **7** with pipe **11** passing through the melted alkali-hydroxide where the sodium is heated to the required operation temperature.

The rate of melting the solid sodium is controlled by the height of the sodium within trough **7** so that when the top level of the molten sodium in trough **7** falls below a desired value the heating apparatus **12** is turned on. In order to prevent slag or sludge from accumulating in trough **7**, a segmented wire mesh band **13** is slowly drawn across the bottom of trough **7**. Band **13** is driven by roller **14**. The slag or sludge thus

removed from trough **7** by band **13** is drawn into the melted alkali-hydroxide from where it can be removed by conventional means.

This invention has the following advantages:

1. The amount of molten sodium in trough **7** can be kept relatively small. If a leak should develop in the trough at some point or another, then the further advantage lies in that smaller amounts of molten sodium are much easier to handles since then they can be dissolved in the melted alkali-hydroxide. If large amounts of molten sodium are used, then some of the molten sodium could reach the surface of the melted alkali-hydroxide and violently react with the atmospheric air.

2. Guide rollers lying within the molten sodium are no longer necessary. This eliminates the problem of the material of which the guide rollers are composed with respect to the material reacting with the sodium. In addition to eliminating the guide rollers in the molten sodium, it is also possible to eliminate a deflecting roller outside of the bath. Such shortens the length of the entire installation.

3. Since the molten sodium in this invention has a relatively small free surface, it is possible to do without the protective gas hood and the inert gas can be introduced into the upper inlet end of the trough **7**. However, when a protective hood is used for reducing the consumption of the inert or protective gas, then in this invention the hood can be made substantially shorter. Furthermore, only one guide roller **8***b* for the metal band **8***d* lies within the range of the protective gas which, in turn, means that the number of roller shaft openings through the hood, and thus the number of places to be sealed, are reduced to two.

Having now described the means by which the objects of this invention are obtained,

We claim:

1. A furnace installation for continuously descaling a metal band comprising a heated tank, melted alkali-hydroxide in said tank, an inclined channel-shaped trough in said tank having an upper inlet end above said alkali-hydroxide and a lower outlet end submerged in said alkali-hydroxide, a metal band extending through said trough, roller means (**8***b*, **8***c*) for pulling said band through said trough, and supply means for feeding molten sodium into said trough for immersing said band and with the point of intersection between the molten sodium and said melted alkali-hydroxide lying in said trough.

2. An installation as in claim **1**, further comprising means for introducing protective gas into the inlet end of said trough and above said molten sodium.

3. An installation as in claim **1**, further comprising a gas hood above said tank and having sides partially submerged in said alkali-hydroxide, and means for introducing protective gas under said hood.

4. An installation as in claim **1**, said supply means comprising a sodium storage container above said tank, a pipe between said container and said trough and extending through said alkali-hydroxide, and heating means for melting the sodium in said tank and feeding the molten sodium through said pipe into said trough at a desired level.

5. An installation as in claim **1**, further comprising wire mesh segmented band means (**13**) extending along the bottom of said trough, and drive roller means (**14**) for slowly dragging said segmented band means along the bottom of said trough to remove scale and sludge.