WIRE-CLEANING MACHINE

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ABSTRACT

An apparatus for continuously cleaning refractory metal wire is described which comprises a base, an upright standard for a wire supply, a plurality of containers, a tension control device, means for guiding wire into and out of the containers, and a means for collecting wire.

7 Claims, 4 Drawing Figures
WIRE-CLEANING MACHINE
CROSS-REFERENCE TO RELATED APPLICATION

Coping U.S. Pat. application, Ser. No. 14,932, concurrently filed herewith, discloses a process in which the subject matter of this invention can be utilized, that is, the cleaning of refractory metal wire.

BACKGROUND OF THE INVENTION

This invention is concerned with a manufacture of refractory metal wire. More particularly, this invention is concerned with an apparatus for continuously cleaning wire after a processing operation, such as, for example, drawing said wire to its desired diameter.

In the copending application the process is disclosed whereby surface contaminants on as-drawn refractory metal wire could be removed by treating said wire with molten sodium hydroxide, nitric acid, and hot water, provided a certain sequence is followed and time limits between and during each step are maintained.

In previous methods for cleaning wire, the wire was dipped manually into the desired solution, but such methods offered no accurate control over the time of each step and in between each step. Also, the manual operations were time consuming and costly, and the result varied with the skill of the operator. Therefore, it can be readily appreciated by one skilled in the art that a machine that would provide a continuous operation and lend itself to a high degree of control during the treating steps and between the treating steps, is an advancement in the art.

OBJECTS AND SUMMARY OF THE INVENTION

It is accordingly an object of the present invention to provide a new and improved apparatus suitable for cleaning refractory metal wire. It is a second object to provide an apparatus that lends itself to a continuous operation. A further object is to provide an apparatus that can be controlled to insure proper time limits during and between the treating steps. These objects are accomplished in one aspect of the invention by the provision of a refractory metal wire that comprises a base, an upright standard for a wire supply, and a means for collecting wire in a spaced-apart relationship. Mounted on the base and spaced between the upright standard and the means for collecting wire are a plurality of containers and a tension control. Means for guiding the wire into and out of the containers are also provided. A wiper assembly positioned after the third container for wiping the solutions from the wire and a wiper guide positioned after the third container for further guiding the advancing wire, positioned after the wire guide, complete the general apparatus.

Brief DESCRIPTION OF THE DRAWINGS

FIGS. 1a and 1b are a side elevational view of one embodiment of the invention.

FIGS. 2a and 2b are a plan view of one embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

For a better understanding of the preferred embodiments of the invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following disclosure and appended claims in connection with the above-described drawings.

With reference to FIGS. 1a, 1b, 2a, and 2b, a base 10 is shown having an upright standard 12 positioned at one end and a means for collecting wire 14 positioned at the other end. A wire 16 is shown drawn from a spool 18 which is mounted on the standard 12, after which the wire proceeds about a tension control means 20, and then about a guide means 28 before being submerged in a container 34 for molten sodium hydroxide. The tension control means 20 comprises a pivot arm 22 mounted to the upper portion of the standard 12 and has at one extreme end thereof a tension spring 24; the tension spring 24 having one end affixed to the arm 22 and the other end affixed to the standard 12 and a pulley 26 affixed to the opposite end of the arm 22. The guide means 28 comprises a pulley 30 mounted in an upright bracket 32 which are affixed to the base 10. The wire 16 is submerged in the container 34 by means of two pulleys 36, 38 attached to a movable arm 40 by means of first 42, and second 44 depending brackets, the two pulleys 36, 38 being positioned so that only the bottom portion of the pulleys 36, 38 are submerged in the molten caustic container 34. To prevent the molten caustic solution in the container 34 from splashing when the pulleys are submerged into the solution and to prevent the caustic from solidifying on the pulleys, which can cause wire breakage, two gas burners 46, 48 are positioned next to the pulleys 36, 38 to regulate the temperature of the pulleys in relationship to the temperature of the molten caustic solution.

The molten caustic solution is heated by means of a ribbon burner 50 positioned between the container 34 and the base 10 and the temperature of the molten caustic solution is regulated by a heat-sensing means 52, such as in this case a thermocouple, which is affixed to the side of the container 34. The entire caustic cleaning operation is enclosed by a protective closure 54, which has affixed to one of its sides a latch 56 for securing the movable arm 40 by means of a rod 58, which extends from the arm 40 and is adapted for latching onto the latch 56. The wire 16 is then drawn about a guide 60 consisting of a pulley 62 mounted in upright brackets 64, which are affixed to the base 10, before being submerged into the second container 66. A ceramic pulley 68 mounted in depending brackets 70 which are mounted to an upright support 72, affixed to the base 10 is used to submerge the wire 16 in the nitric acid container. The pulley 68 is mounted to allow it to be completely submerged in the nitric acid solution. The wire 16 is then drawn about a third guide 74, consisting of a pulley 76 mounted in upright brackets 78, which are affixed to the base 10 before being submerged into the third container 80. The wire 16 is drawn through the water container 80, which consists of a water level holder 82, a drop container 84 to catch the overflow, which contains a drain 86 in its lower part to allow excess water to be removed. To insure complete coverage of the wire 16 with water, while the wire 16 is being drawn through the water level holder 82, water enters through an inlet valve 88 positioned over the water level holder 82. The wire 16 is drawn through a wiping means 90, which consists of two standard wipers 92, 94 filled with an absorbent material and attached to allow the wire to pass through the wiping means 90. The wire 16 is then drawn through a wire guide 98 comprising two ceramic tubes 100, 102 positioned on an upright 104, which is affixed to the base 10, so as to allow the wire 16 to pass through the two tubes 100, 102 before being wound on the means for collecting the wire 14, which is attached to a drive means 106. The drive means 106 in this instance, consists of a motor 108 affixed to a base 110 which in turn is affixed to the base 10.

While there has been shown and described what are at present considered the preferred embodiments of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made herein without departing from the scope of the invention as defined by the appended claims.

We claim:

1. An apparatus for continuously cleaning refractory metal wire comprising a base, an upright standard for a wire supply and a means for collecting wire in a spaced-apart relationship, mounted on said base, a plurality of containers spaced in between said standard and said means for collecting wire, a tension control for wire spaced in between said standard and said means for collecting wire, means for guiding wire into and out of said containers, means for wiping wire between said containers and said means for collecting wire, and guide means for guiding wire into said means for collecting wire;
said tension control comprises an arm pivotally mounted at the upper portion of said upright standard, a tension spring at one extreme end of said arm having one end affixed to said arm and the other end affixed to said standard, and a pulley affixed to the opposite end of said arm; and said plurality of containers comprises a first, second, and third container, said first container being suitable for holding molten caustic and having a means for heating said caustic, a temperature control means, a container closure means and means for submerging a wire into said first container, said second container suitable for holding nitric acid solution and having a means for submerging a wire into said second container; and said third container suitable for holding water.

2. An apparatus according to claim 1, wherein said first container has a heat sensing means affixed to the side of said container and said means for heating comprises a gas ribbon burner between said container and said base.

3. An apparatus according to claim 1, wherein said means for submerging a wire into said first container comprises an upright support, an arm extending from the upper end of said support having two depending brackets, each bracket having a pulley and a gas burner at the end opposite to said arm, and a rod extending from said arm and adapted for latching onto said container closure means.

4. An apparatus according to claim 3, wherein said means for submerging a wire into said first container are ceramic pulleys.

5. An apparatus according to claim 4, wherein said pulleys are partially submerged in said molten caustic solution.

6. An apparatus according to claim 5, wherein said means for submerging a wire into said second container is a ceramic pulley.

7. An apparatus according to claim 6, wherein said pulleys are completely submerged in said nitric acid solution.