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APPARATUS FOR ANNEALING METAL

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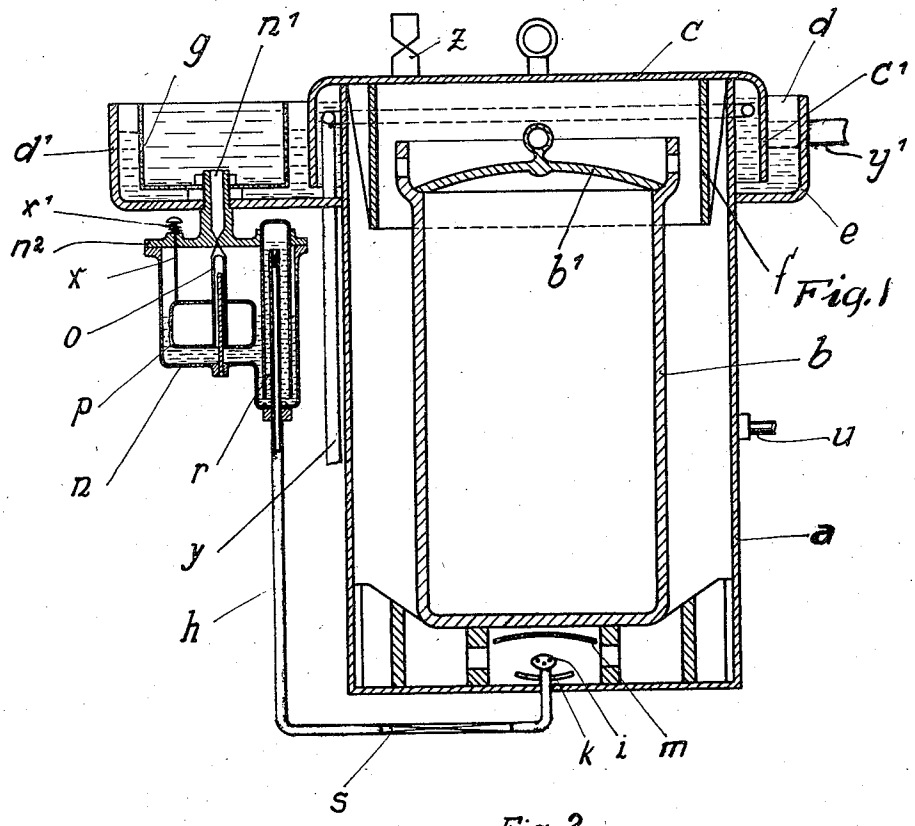
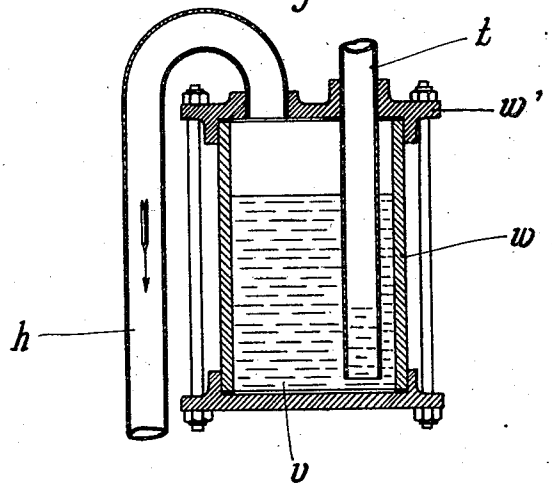


Fig. 1

Fig. 2



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APPARATUS FOR ANNEALING METAL.

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My invention relates to improvements in the method of and apparatus for annealing metal, and more particularly in the method in which the heated metal, such as wire, is cooled within an atmosphere of a protective gas. One of the objects of the improvements is to provide a method in which the injurious effect of the protective gas on the metal is reduced, and with this object in view my invention consists in cooling the heated metal in vacuo, so that the amount of protective gas acting on the metal is reduced. In carrying out my improved method I make use of a receptacle adapted to receive the metal to be cooled and having a supply of protective gas, which supply includes means for controlling the pressure of the gas within the receptacle. The protective medium is supplied to the apparatus either in gaseous form, or in liquid form, said liquid being vaporized within the said receptacle.

For the purpose of explaining the invention two structures suitable for putting the method into effect have been shown in the accompanying drawing in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawing,

Fig. 1, is a sectional elevation showing the apparatus, the protective medium being supplied to the cooling receptacle in a liquid state and gasified at the bottom of the said receptacle, and

Fig. 2, is a sectional elevation showing means for controlling the gas within the cooling receptacle, said means being included in a supply pipe for gaseous protective medium.

In the example shown in Fig. 1 the apparatus consists of a receptacle a adapted to have a container b placed therein, and provided with a cover c for tightly closing the same. As shown a liquid seal is provided for tightening the cover c, said seal comprising an annular cup d surrounding the top part of the receptacle a and having a supply of water through a pipe y and a delivery of water through a pipe y^1. The cover c is formed with a flange c^1 projecting downwardly therefrom and into the liquid confined within the cup d. Preferably the cover c is provided with a concentric flange f adapted to insulate the liquid seal from the hot container b. The container b is designed to receive the metal to be cooled, and it is provided with a lid b^1.

In a lateral portion d^1 of the cup d a casing g is located, which casing is adapted to receive a suitable protective liquid. At its bottom the said casing communicates through a tubular portion n^1 with a casing n closed at its top by a lid n^2, and containing a float p. The said float carries a needle valve o adapted to control the delivery of the protective liquid from the casing g. The casing n communicates through a siphon and a pipe h with a spout i adapted to deliver the protective liquid to the bottom part of the receptacle a, and below the spout i there is a pan k adapted to gather the liquid discharged from the spout i for gradually vaporizing the same. Above the spout i there is a hood m.

The siphon comprises a tubular member r, which is closed at its top and open at its bottom, and which encloses the top part of the pipe h projecting into the same to a point at a higher level than the liquid contained within the casing n. The receptacle a is connected by a pipe u with a vacuum apparatus. After placing the container b into the receptacle a and putting the cover c on the said receptacle, a vacuum is produced within the receptacle a through the pipe u. Therefore the protective liquid rises within the tubular member r and to the top part thereof, whereupon it flows downwardly to the pipe h and a filter s to the spout i. The liquid discharged from the said spout is gathered by the pan k and vaporized. Thus the vacuum within the receptacle a depends on the difference of the levels within the casing n and the tubular member r. By raising or lowering the pipe h within the tubular member r the vacuum within the receptacle a may be varied as desired. The liquid taken from the casing n is replaced by liquid from the casing g. Z is an exhaust valve.

In some cases it is desirable to supply protective liquid to the receptacle a independently of the vacuum produced within the receptacle. For this purpose a rod x is passed through the lid n^2 and into the casing n, and by means of the said rod the float p may be pressed downwardly by hand for opening the valve o. The rod x is acted upon by a spring x^1. When depressing the float p the casing n is filled with protective

liquid, and finally the pressure of the liquid contained within the casing g forces the protective liquid through the pipe h even if there is no vacuum within the receptacle a.

In Fig. 2 I have shown a modification of the means for controlling the vacuum, which means are designed for use in connection with a cooling receptacle having a supply of the protective medium in gaseous form. As shown the said apparatus comprises a casing w closed at its top by a lid w^1 and partly filled with a suitable liquid v. Through the lid w^1 a supply pipe t for the protective gas is passed downwardly and to the bottom of the casing w. A second pipe h opens through the said lid into the top part of the casing w and above the level of the liquid v. The pipe t is connected with a supply of a suitable gaseous protective medium, and the pipe h is connected with a cooling receptacle such as has been described with reference to Fig. 1.

As long as there is no vacuum within the receptacle a the levels of the liquid within the casing w and the pipe t are alike, and there is no supply of protective gas to the receptacle a. When reducing the pressure within the receptacle a the liquid within the pipe t sinks, until gaseous protective medium flows from the pipe t and through the body of the liquid v, the vacuum maintained within the receptacle a corresponding to the difference between the level of the liquid v and the bottom part of the pipe t.

While in describing the invention reference has been made to particular examples embodying the same I wish it to be understood that my invention is not limited to the use of the apparatus shown in the drawing.

I claim:

1. An apparatus for cooling annealed metal, comprising a container adapted to receive the metal to be cooled, a cover providing a tight closure for said container, means to fill said container with protective gas, and means controlled by the vacuum within the container for regulating the said supply of gas.

2. An apparatus for cooling annealed metal, comprising a container adapted to receive the metal to be cooled, a cover providing a tight closure for said container, and means to fill said container with protective gas, said means including a chamber containing a float and having a supply of liquid adapted when vaporized to supply the protective gas, said supply being controlled by said float and a passage connecting the float chamber and said container, said passage including a siphon structure whereby the supply of liquid to the container is regulated by the degree of vacuum therein.

3. An apparatus for cooling annealed metal, comprising a container adapted to receive the metal to be cooled, a cover having a liquid seal and providing a tight closure for said container, and means to fill said container with protective gas, said means including a chamber containing a float, a receptacle within the liquid of said liquid seal and containing a liquid adapted when vaporized to supply a protective gas, said receptacle having a discharge into said chamber and controlled by said float, and a conduit connecting the float chamber to said container and including a siphon structure regulating the supply of liquid to the container under control of the degree of vacuum therein.

4. An apparatus for cooling annealed metal, comprising a container adapted to receive the metal to be cooled, a cover providing a tight closure for said container, a supply of vaporizable protective liquid opening into said container near the bottom thereof, a receptacle within said container in position for gathering the liquid delivered from said supply, and means controlled by the vacuum within the container for regulating the supply of liquid thereto.

5. Apparatus for cooling and at the same time protecting annealed metal, comprising a chamber, means for exhausting gas therefrom, means for supplying a protective fluid to the chamber, and means controlled by the degree of vacuum in the chamber for regulating the supply of said fluid.

6. Apparatus for cooling and at the same time protecting annealed metal, comprising a chamber, means for exhausting gas therefrom, means for supplying a protective fluid to the chamber, and means controlled by the degree of vacuum in the chamber for regulating the supply of said fluid, said means comprising a trap containing a liquid, supply and discharge passages communicating with the trap, the discharge passage supplying the protecting fluid to the chamber, and the liquid level in the trap being controlled by pressure differences affected by the vacuum in the chamber to regulate the supply of the protective fluid.

In testimony whereof I hereunto affix my signature.

FRITZ GIESECKE.