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TREATING METALS.

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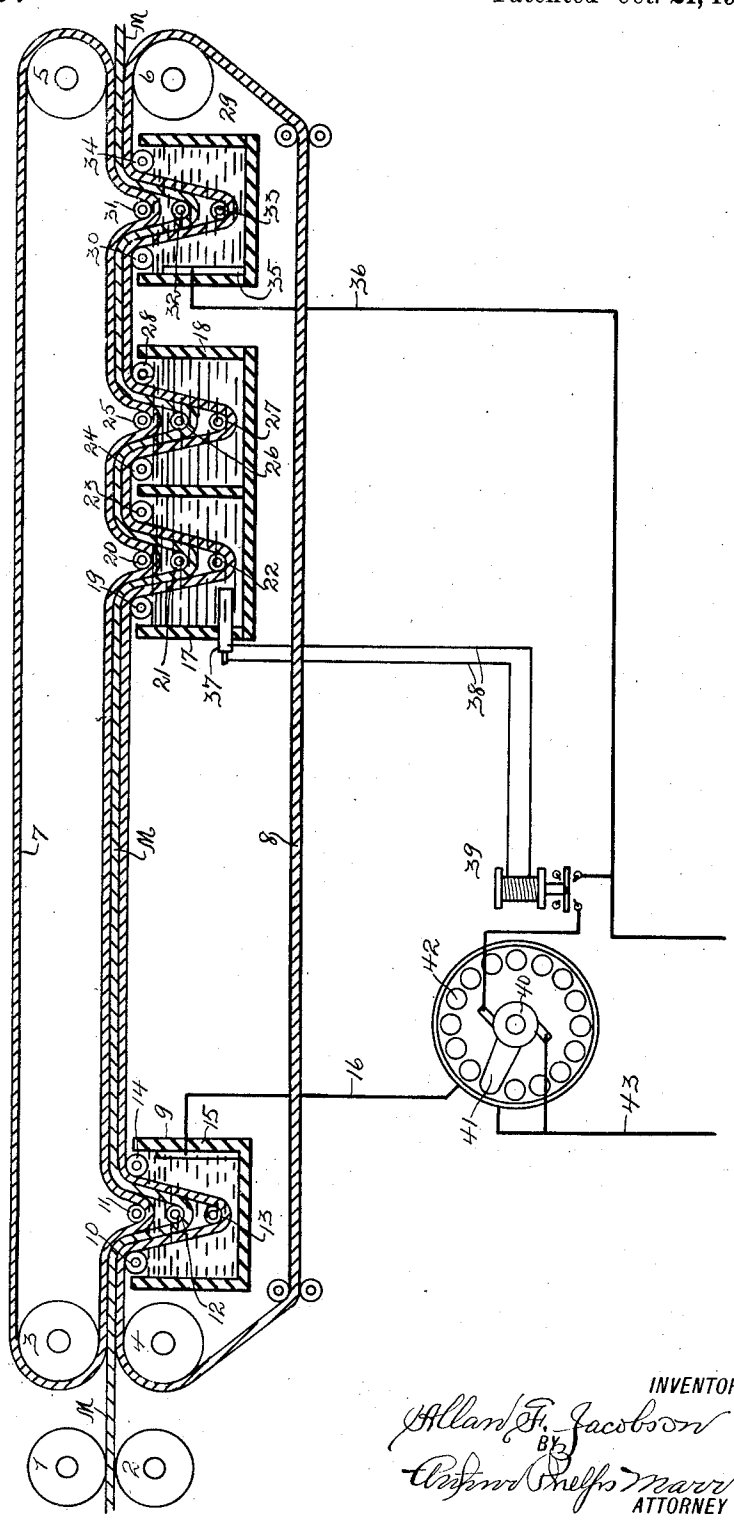
1,319,085. Patented Oct. 21, 1919.



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TREATING METALS.

1,319,085. Specification of Letters Patent. Patented Oct. 21, 1919.

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To all whom it may concern:

Be it known that I, ALLAN F. JACOBSON, a citizen of the United States, and resident of the borough of Richmond, county of Richmond, city and State of New York, have invented certain new and useful Improvements in Treating Metals, of which the following is a specification.

The object of this invention is to provide a means for automatically treating metals, and more particularly for annealing metals by drawing or rolling and cleaning them after they have been annealed. As I refer to annealing during or directly after rolling, it may be understood that the metal that I refer to may generally be considered brass, bronze, copper, or other metals which harden in the process of rolling.

I have discovered that much time is consumed in rolling a strip of metal for annealing or in placing metal sheets or plates in the ovens for annealing purposes, and that because of the difficulty of evenly distributing the heat, sheets, and particularly rolls are sometimes destroyed during the annealing process.

My object then is to provide a means for annealing and cleaning metals during actual process of rolling, or directly thereafter, and without the necessity of removing the metal from the rolling mill, or of coiling it, or otherwise preparing it for annealing, and the process or method which I have devised will be set forth as the specification progresses.

As another object, the invention contemplates the provision of a means for automatically regulating the temperature to which the strip is heated and maintaining the strip heated during the cleaning process.

A still further object of the invention resides in the provision of a means for regulating the temperature of the strip by the temperature of the cleaning liquid.

The following is what I consider a good means of carrying out my invention, and the accompanying drawings should be referred to for a complete understanding of the specification which follows.

In the drawings, the figure shows in side elevation and partly in section the device used in my method.

Similar reference numerals indicate like parts in all of the figures where they appear.

In describing my method, I will first describe the method that I employ to accomplish the desired purpose. It will be noted, however, that for the most part, the drawings show this device as a diagram. The reason for this is quite obvious. It is possible to vary the arrangement or change the proportions to meet requirements, and therefore, only a simple description of the device employed by me is deemed necessary.

At 1 and 2, I show rollers which may be the rollers of a rolling or drawing mill, or which may be a die or plates from which rolled or drawn metal will be received.

Arranged adjacent to the rolling mill, or the rollers 1 and 2, thereof, are a plurality of rollers 3 and 4, which I term feed rollers. These rollers 3 and 4 receive the metal after it is discharged from the mill and move it by means to be later described through the devices employed in my process.

In line with the rollers 3 and 4, and placed a distance therefrom, is another pair of rollers 5 and 6, and between the rollers 3 and 5, I arrange a continuous conveyer belt 7 preferably of asbestos or other fire-proof material. A second conveyer 8 passes around the rollers 4 and 6, and this belt should also be of asbestos or other fire-proof material. Adjacent to the rollers 3 and 4, is a tank 9 provided with a plurality of rollers 10, 11, 12, 13 and 14, all of which may be arranged within the tank and it will be noted that while the conveyer belts 7 and 8 and the strip of metal M pass into the tank over the roller 10, and closely adjacent to each other, the rollers 11, 12 and 13 are placed apart, so that during its passage through the tank 9, the conveyer belts are drawn away from the metal M exposing this metal to the contents of the tank.

Within this tank 9, and probably adjacent to one side thereof, I arrange a metallic plate 15, and I connect this plate with a lead or electrical conductor 16 which will be again referred to.

The tank 9 contains mercury in constant contact with the plate 15, and with the metal M passing through the tank. Placed away from the tank 9, are other tanks 17 and 18, and these two tanks 17 and 18 may be formed as shown in the drawing as one unit, with a proper dividing wall to keep their contents separated, or two entirely separate tanks may be employed.

Rollers 19, 20, 21, 22 and 23 within the tank 17, and rollers 24, 25, 26, 27 and 28 within the tank 18 serve the same purpose as do the rollers 10, 11, 12, 13 and 14 in tank 9, receiving and conveying through the tank and through the contents thereof, the asbestos conveyer belts and the metal strip arranged between them, separating the strip of metal from its adjacent conveyer belts during its passage through each of the tanks.

The tank 17 will probably contain an acid bath, sometimes termed a "pickling" bath, and the tank 18 will contain clear water, or preferably, will be so connected that a continuous stream of water may pass through this tank.

A fourth tank 29 arranged approximately adjacent to the rollers 5 and 6 is similar in construction to the tank 9, and is provided with rollers 30, 31, 32, 33 and 34, which serve the same purpose as do the other small rollers described as contained in or adjacent to the tanks 9, 17 and 18.

This tank 29 is also provided with a metallic plate 35 to be later referred to.

Within the tank 17, I arrange a thermopile 37 or other thermostatic device electrically connected by wires 38 with a relay 39. This relay operates a motor 40 which in turn, controls or operates the arm 41, of a current regulator 42.

Now I will describe the method of operation as employing the devices previously referred to, and it is desired to roll the copper to such a degree that the proper reduction thickness cannot be accomplished by a single rolling operation, or let us consider that it is desired that the finished metallic sheet or strip should be annealed. The metallic strip M will be received from the rollers 1 and 2, and will pass between the conveyer belts 7 and 8 and between the rollers 3 and 4. The rollers 3 and 4 of the belts 7 and 8 will convey the metal through the tank 9, into and through the tanks 17 and 18, and into the tank 29. When the end of the metal strip is received in the tank 29, a suitable electric current is caused to pass through the leads or supply lines 43 and 36, one of these lines or leads being connected directly to the plate 35 in the tank 29, and the other lead passing into the current regulator 42. It will be noted that the motor 40 is directly connected to the line lead 43 and through the relay 39 is connected to the line lead 36.

Current will pass through the current regulator 42 into the conductor 16 to the tank 15, and from thence into the metallic plate or strip being treated, to the tank 29, plate 35, and back to the line.

The thermostatic device 37 will control the degree to which the metallic plate or strip M may be heated, and if there be a tendency to overheat, the thermostatic device 37 through the relay 39 and motor 40 will introduce into the line cutting down the current applied to the plate or strip M. If the normal or allowable temperature is not reached, a reverse operation will result, and resistance will be cut out by the movements of the arm 41. and the current regulator.

The actual annealing will occur in the space between the tanks 9 and 17, and when the metal passes through the tank 17, the acid bath will remove any foreign matter or oxidization that may result from the heating of the metal; the water in the tank 18 removing the acid before the metallic strip enters the tank 29.

The electric current continues to pass through the metallic strip until it reaches the tank 29, will warm the strip after its passage from the tank 18, but it is not desired that the separation of the tanks 18 and 29 should be sufficiently great to allow the metal to become heated to a degree sufficient to cause oxidization.

The content of the tanks 9 and 29 will probably be mercury, although it is possible that I may utilize other metallic salts in solution or any other material that may be retained in a liquid- or semi-liquid state, and which will serve as an efficient electrical conductor between the plates and the metallic strip passing through the tank.

It is possible that I may desire to change the position of the tanks. I may place the tank 29 approximately in the position now occupied by the tank 17, moving the tanks 17 and 18 to the relative position of the present tanks 18 and 29, and in this way, there would be no passage of current through the metallic strip under treatment and while said strip is passing through the acid or water-containing tanks. The length of the conveyer belts and the distance between the tanks may be changed at will, and other modifications may be made within the scope of the appended claims, without departing from the principle or sacrificing the advantages of the invention; although I prefer to retain the principle as heretofore set forth, wherein a continuous treatment is made possible and wherein the resistance of the metal treated is dependent upon to coöperate with the current supply to raise the temperature to an effective degree. In certain classes of work, the conveyer belts may be omitted, and obviously, hand regulation of the current may be substituted for the automatic device shown and described.

Having carefully and fully described my invention, what I claim and desire to secure by Letters Patent is:

1. The method of annealing metal which consists in advancing said metal in a continuous strip bringing successive portions of said strip under the heating action of an

electric current, passing said strip through a cleaning liquid while still under the action of the electric current and automatically regulating the temperature to which the strip is heated.

2. The method of annealing metal which consists in advancing said metal in a continuous strip bringing successive portions of said strip under the heating action of an electric current, passing said strip through a cleaning liquid while still under the action of the electric current and automatically regulating the temperature to which the strip is heated by the temperature of the said cleaning liquid.

3. The method of annealing metal which consists in passing the same in a continuous strip between and in close contact with a pair of moving heat insulating members, applying an electric current to the portion thereof between said members and passing the strip through a cleaning solution at a point between those at which the current is supplied.

4. An apparatus for annealing metal strips comprising a pair of endless heat insulating bends having adjacent reaches adapted to receive the metal strip therebetween to advance the latter, means for electrically heating said strip, a tank located under the said reaches, a series of rollers carried by said tank, whereby the said bends and strip are spaced apart during passage through the tank.

5. In an apparatus for annealing metal an endless pair of heat insulating bends having adjacent reaches adapted to receive the metal in a strip therebetween, one or more tanks located under the general normal plane of said adjacent reaches, and means in said tanks adapted to depress the said bends and strip thereinto and to space them apart.

Signed at New York city, in the county and State of New York this 11th day of Jan., 1918.

ALLAN F. JACOBSON.