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METHOD OF INCREASING THE ELASTICITY OF METAL ARTICLES.

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This invention relates to a method of increasing the elasticity of metal articles, such method being commonly referred to in a commercial way as a method of imparting tension to the articles, and while capable of general use, the present invention was developed primarily for imparting tension to the steel locking rings commonly used on automotive vehicle wheels.

Heretofore locking rings have been made by rolling a steel bar to the desired cross section and then cutting the rolled bar into suitable lengths. These two steps have usually been carried out at the steel mill. Upon receipt of the lengths of the rolled steel bars, they are usually cut at each end to accurate lengths and also to form the ends of each length for a suitable joint when they are brought into abutting relation. The lengths of steel are next coiled to define a ring after which they are placed in a hot pickling solution to remove scale and to impart tension. The exact manner of imparting tension by the hot pickling solution has never been understood but it has been commonly supposed that some chemical reaction of the pickling solution with the steel has effected this increase in elasticity.

I have discovered that this increase in elasticity is brought about, not by a chemical reaction as commonly supposed, but by the application of heat to the steel articles such heat being rather less than that used for annealing and resulting in an increase in elasticity.

It is the primary object of the present invention to provide a new and improved process for manufacturing metal articles, particularly steel locking rings, whereby the articles will receive a substantially uniform and proper tension by heat treatment instead of depending upon the more uncertain action of pickling solutions.

Another object is to provide a new and improved process of the above character wherein the various steps of manufacture are arranged in a better order to expedite the work, and which will result in a great saving in cost of manufacture, and time and labor expended.

These and further objects and advantages will be more fully described hereinafter and will be pointed out in the appended claims.

For the purpose of illustrating my invention, I will describe the manufacture of a locking ring, although it will be understood that the invention in its broadest concept may be applied to numerous other uses.

A bar of steel is rolled to the desired cross section and then cut into suitable lengths as has been the previous custom. These lengths are then cut at each end to properly shape the ends and also to cut the same to accurate lengths. I next pickle these lengths of steel to remove the scale and this pickling operation has as its sole function the removal of the scale. The next operation consists in cold bending the lengths of steel to coil the same into rings. The rings thus formed lack the desired degree of elasticity or tension and if opened to a degree such as encountered in use, they would fail to return to their proper shape. The desired degree of elasticity is imparted to the rings by subjecting them to a heat lying substantially between 200° F. and 800° F. for a period varying substantially between 30 minutes and ½ minute respectively. In other words, the lesser the degree of heat, the greater the time required, or conversely, the greater the degree of heat to which the rings are subjected, the lesser the time required to properly tension the rings. I have found that by employing a heat in the neighborhood of 300°–400° F. for a period of three or four minutes, excellent results may be obtained. This heat may be generated in any manner desired, as by means of heated gases, liquid baths of any sort whatever, or electrically, electromagnetically, or by resistance or by induction methods, although in the above specific example, a gas oven was used for imparting the desired temperature to the articles.

From the foregoing, it will be noted that I have completely changed the order of manufacture by placing the pickling step ahead of the coiling step and using such pickling step merely to remove scale from the metal before it is coiled in the bending machine. Also the tensioning step is carried out by a heat treatment of a positive and definite character so that the finished articles will have a substantially uniform and proper degree of elasticity. It will also be noted that in my improved process, the articles emerge in a dry condition and hence do not require an extra step of drying to

prevent rust or other undesirable conditions.

I claim—

1. The process of restoring the elasticity in steel locking rings of automobile wheels which consists in first cold working the blank stock to produce the rings, thereafter subjecting the produced rings to a heat lying substantially between 200° and 800° F. for a period varying between thirty minutes and one half minute.

2. The process of restoring the elasticity in steel locking rings of automobile wheels which consists in first cold working the blank stock to produce the rings, thereafter subjecting the produced rings to a heat lying substantially between 300° and 400° F. for a period varying between three to four minutes.

In testimony whereof I hereunto affix my signature.

GEORGE L. KELLEY.