

A. KREIDLER.
 DEVICE FOR ANNEALING METALLIC ARTICLES.
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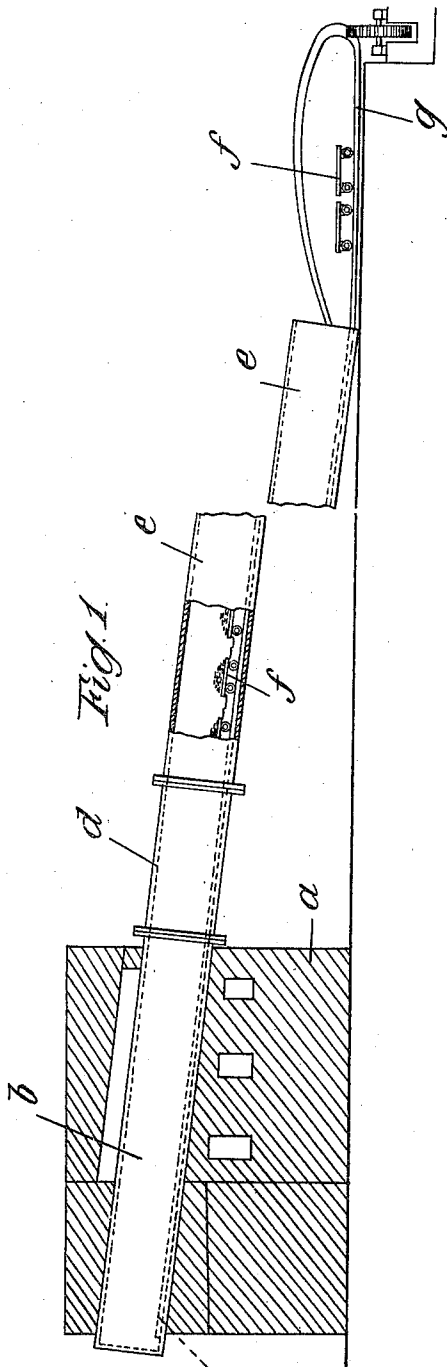


Fig. 1.

Witnesses:-
 G. V. Rasmussen
 John A. Schenker

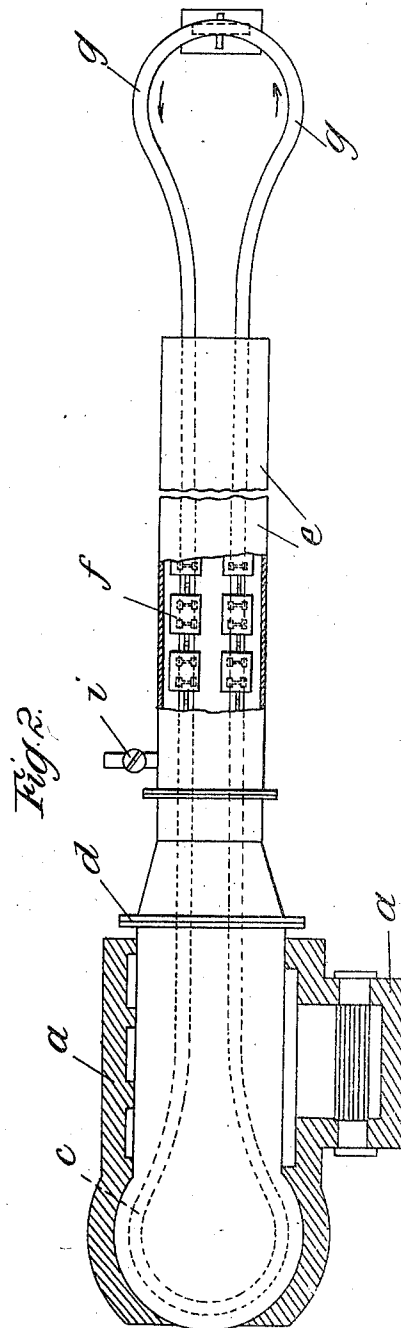


Fig. 2.

Inventor
 Anton Kreidler
 By *Ponson & Thwait*
 Attorneys

UNITED STATES PATENT OFFICE.

ANTON KREIDLER, OF STUTTGART, GERMANY.

DEVICE FOR ANNEALING METALLIC ARTICLES.

1,038,901.

Specification of Letters Patent.

Patented Sept. 17, 1912.

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To all whom it may concern:

Be it known that I, ANTON KREIDLER, manufacturer, a subject of the German Emperor, and resident of Stuttgart, Germany, with the post-office address Hasenbergsteige 18, have invented new and useful Improvements in Devices for Annealing Metallic Articles, of which the following is a specification.

10 The invention relates to a device for annealing metallic articles.

It is based on the known method in which metallic articles are conducted through an annealing retort by means of an endless conveyor consisting of a chain or belt, or of an annealing truck running on rollers. In this instance the conveyor runs through pipes which are connected in an air-tight manner with the retort and in the interior of which pipes, as in the retort, an atmosphere of non-oxidizing gases, such as nitrogen, hydrogen, carbon dioxide or the vapors of liquids is maintained, in order to prevent the oxygen of the atmosphere from coming in contact with the glowing or hot articles and oxidizing them. In order to afford further protection against the admission of atmospheric air, the open ends of the said pipes dip either into water—as is done, for instance, in German Patent 138520—or else the gas itself forms a seal shutting out atmospheric air, inasmuch as the pipes are led away, from both sides of the retort, for example downward for a short distance and then upward, or first upward and then downward. In the latter event, a seal shutting off contact with the exterior, is intended to be formed by the monoxidizing gases themselves, if the latter be lighter than air (German Patent No. 163415). In all known appliances of this kind the pipes issue from both sides of the retort and reunite later, when the articles have been cooled down. In this event it is assumed that when the articles are cool they will no longer be oxidized by the oxygen of the air. In order to effect this cooling as quickly as possible after leaving the retort the pipes are also cooled, in many cases, by a cooling device. When the pipes are excluded from connection with the exterior by means of water, the retort is continually charged with water vapor, which is liberated at the point where the hot pipes dip in the water tank. This causes a considerable loss of heat, and more-

over the only articles that can be annealed in such an atmosphere are such as will bear immersion in water, i. e. chiefly articles of copper, and perhaps brass. In the case of iron or steel articles, however, this method is inapplicable, since immersion in water either causes these articles to rust or else to be hardened in an undesired manner. For iron and steel articles the other method alone is applicable, namely that in which the exclusion of the atmospheric air is effected by non-oxidizing gases which are either lighter or heavier than air. In this method, however, a considerable loss of heat is sustained because the entire heat of the hot metallic articles issuing from the retort is lost.

The assumption that in the case of gases of different density, an absolute exclusion of the one gas can be effected by the other, is erroneous, and is opposed to the law of the diffusion of gases. In reality the behavior of such two gases in relation to each other is such that, when for instance the light gas is at the top, a gradual mixing takes place downwardly, in such a manner that, for instance, between nitrogen and atmospheric air, the oxygen content gradually increases from above downward. To prevent oxidation of the metallic articles which are moving in this atmosphere, all that is necessary is to see that the places at which a, so to speak, injurious content of oxygen is still present are displaced so far downward that the articles will be comparatively cool by the time they get there. Care must therefore be taken that the cooling of the annealed metallic articles is effected as quickly as possible after they issue from the retort; but on the other hand, in order to facilitate the utilization of the heat, it is desirable that the heat of the annealed metallic articles should be simply eliminated, as is effected to a large extent by means of a cooling device placed close to the retort.

The novelty of the present invention consists in that an interchange of heat is brought about between the metallic articles entering the retort for the purpose of being annealed, and the annealed articles issuing from the retort. In order to achieve this result the conveyers for the articles fed into the retort and those issuing from the retort, are situated as close as possible to each other, so that both devices (annealing truck tracks)

are housed in the one pipe or else in two pipes lying close together. The heat of the articles issuing from the retort is then taken up by the articles that are being fed into the retort, and conversely the cool temperature of the entering articles is transmitted to the issuing articles. To enable this exchange of heat to take place gradually, the single wide pipe or two adjoining narrow pipes are made of suitable length.

By means of this device both the metallic articles on their way to the retort and those issuing from the retort, will attain an equal, comparatively low temperature in a comparatively short time. This temperature will soon be so low that if any atmospheric air finds its way in, the oxygen of same can no longer exert any oxidizing action on the metallic articles. By this means, moreover, the so-called sealing of the delivery pipe in relation to the air—which is always emphasized in the known methods—becomes entirely superfluous. The pipes which house the two haulage tracks in common may be quite open on the side farthest away from the retort if their length has been properly selected. This absolute freedom of the mouth of the delivery pipe and the adjoining perfectly open curve exposed to the air and on which the trucks are unloaded of the annealed articles and reladen with the articles to be annealed, enables the whole plant to be served in a much better and more intensive manner.

It is advisable to slope the entire system in a straight line when the atmosphere in the retort and delivery pipe consists of non-oxidizing gases which are lighter than air, in order that the highest point may be the hottest, and the lowest point the coolest. A special upward or downward bend in the delivery pipe is regarded as quite superfluous. Before beginning work, the interior of the retort and delivery pipe is filled with an atmosphere of non-oxidizing gas, such as nitrogen, that is lighter than air, and such gas is also supplied while the apparatus is working. By this means the heavy air is driven back and the critical point at which still active oxygen is found is displaced so far in the downward direction that the metallic articles are already cooled down to such an extent by the time they reach that point that oxidation can no longer take place. This operation is assisted by the comparatively large masses of metal that are present together in the common discharge pipe at equal temperature. Even when any excess of oxygen be present at the critical point, the oxidation is distributed over the total quantity of metal.

The device forming the subject of the invention is illustrated in the drawing, Figure 1 being an elevation partly in section and Fig. 2 a plan view partly in section.

The furnace *a* surrounds the annealing retort *b* in the rearward portion of which is situated the curve *c* of the conveying device. The delivery pipe *e* is secured in an air-tight manner to the other end of the retort; and in the interior of the said pipe the conveying devices *f* (preferably trucks running on a track) move in opposite directions.

g is the second curve—outside the delivery pipe—on which the conveyer trucks *f* make their return trip. Both the retort *b* and the delivery pipe *e*, with the conveyer trucks *f* running inside, are arranged to slope downward in a straight line.

At *i* is a closable pipe connection through which the light, non-oxidizing gases can be introduced.

Now what I claim and desire to secure by Letters Patent is the following:

1. In devices for annealing articles, the combination of a retort, means extending into said retort and arranged to convey the articles into and out of said retort at the same side thereof, and means connected with and extending from said retort over and covering said conveying means.

2. In devices for annealing metallic articles, the combination of a retort, a conveying device extending into said retort and describing a returning curve therein whereby the articles are moved into and out of said retort at the same side thereof, and means connected with and extending from said retort over and covering said conveying device.

3. In devices for annealing metallic articles, the combination of a retort, a conveying device extending into said retort and describing a returning curve therein whereby the articles are moved into and out of said retort at the same side thereof, said device having its feed portion and its return portion substantially parallel and in close proximity, and means connected with and extending from said retort over and covering said conveying device.

4. In devices for annealing metallic articles, the combination of a retort, a conveying device extending into said retort and describing a returning curve therein whereby the articles are moved into and out of said retort at the same side thereof, and a common delivery pipe connected with and extending from said retort and surrounding the feed portion and the return portion of said feeding device.

5. In devices for annealing metallic articles, the combination of a retort, a conveying device extending into said retort, and describing a returning curve therein whereby the articles are moved into and out of said retort at the same side thereof, and a common delivery pipe connected with said retort in an air-tight manner and extending from said retort so as to surround the feed

portion and the return portion of the feeding device, said delivery pipe being open at the end opposite to that which is connected with the retort.

5 6. In devices for annealing metallic articles, the combination of a retort and a conveying device extending in the said retort and describing a returning curve therein whereby articles are moved into and out of
10 said retort at the same side thereof, said conveying device being arranged at an angle to the horizontal.

7. In devices for annealing metallic articles, the combination of a retort and a conveying device extending into said retort and describing a returning curve therein whereby the articles are moved into and out of
15 said retort at the same side thereof, said conveying device having its feed portion and its return portion arranged substantially parallel and in close proximity to each

other and extending at an angle to the horizontal.

8. In devices for annealing metallic articles, the combination of a retort, a delivery
25 pipe connected with said retort at one end and having its opposite end open and means extending through said pipe into the retort and arranged to convey the articles through
30 said pipe and into and out of said retort at the same side thereof, said conveying means also extending beyond the open end of said pipe.

In testimony, that I claim the foregoing as my invention, I have signed my name in
35 presence of two witnesses, this 22nd day of November 1911.

ANTON KREIDLER.

Witnesses:

PAULINE KLATNER,
PAULINE MÜLLER.