

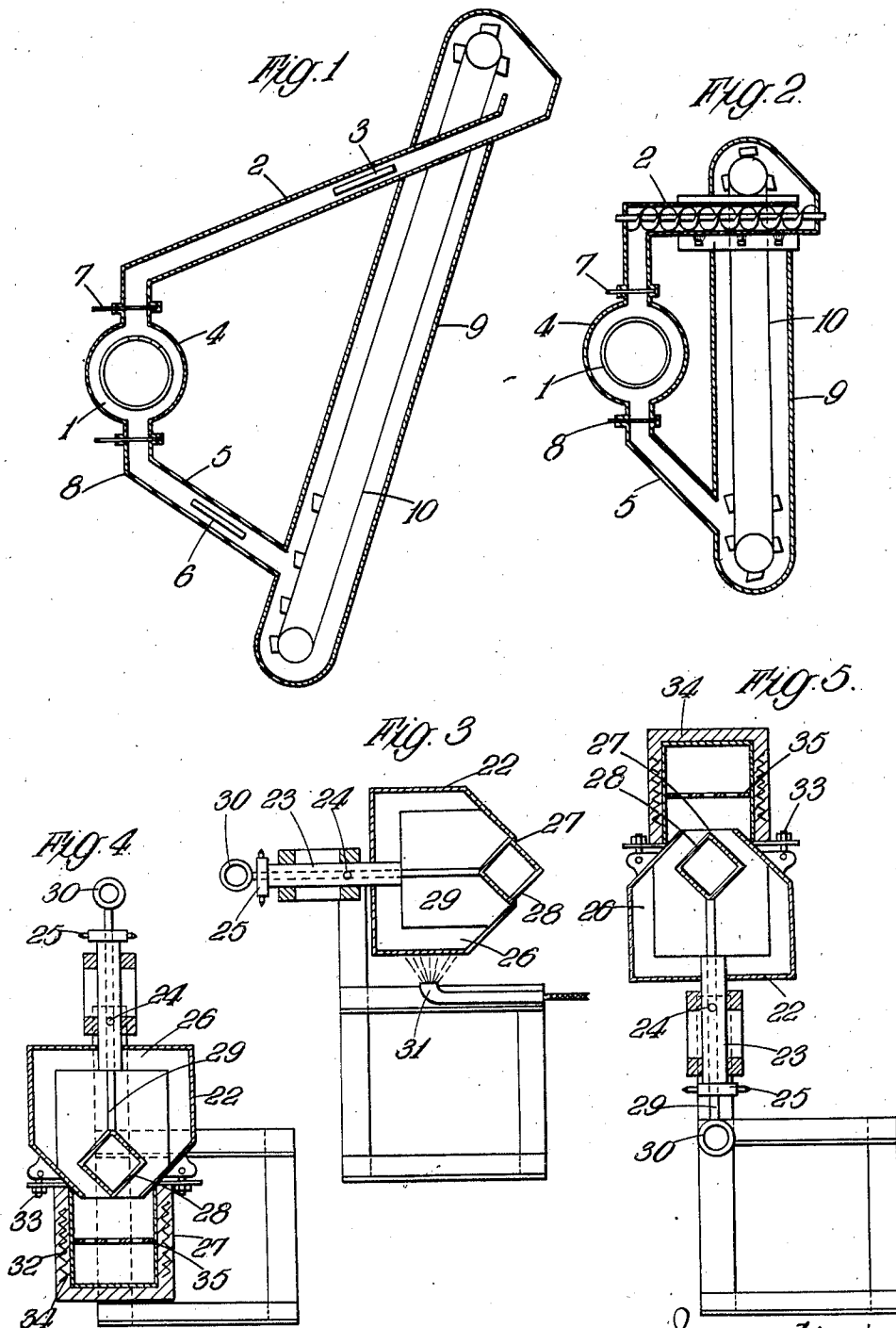
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PROTECTION OF METALLIC SURFACES FROM CORROSION

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PROTECTION OF METALLIC SURFACES
FROM CORROSIONSherard Osborn Cowper-Coles, Sunbury-on-
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9 Claims. (Cl. 91—70.1)

The present invention relates to the protection of metallic surfaces from corrosion by treatment by the process known as Sherardizing, according to which the article to be protected is heated in a closed vessel with a mixture composed of or containing the dust or powder of a metal with which it is desired to coat the surface. Hitherto in carrying out this process it has been customary to introduce the articles to be treated, together with a supply of the Sherardizing mixture, into a closed container, the temperature of the articles and the mixture being then raised to the degree necessary to produce the desired coating action while, by such means as rotating the container, the articles and the mixture are maintained in relative rotation or agitation so that the former are uniformly treated. After this process has been continued for the necessary time, the articles are withdrawn from the mixture which may be used again, but it will be clear that there is considerable loss both of time and heat.

According to the present invention the articles to be treated are contained in a receptacle into which the Sherardizing mixture is introduced and from which it is withdrawn prior to the removal of the coated articles, heat sufficient to raise the mixture to the operative temperature being applied to it only prior to its introduction into or subsequently to its removal from the receptacle. Thus it is possible to maintain the Sherardizing mixture in a heated condition while preventing its oxidation due to ingress of air when the apparatus is opened for insertion and removal of the articles under treatment. This method may be carried on in a number of ways; for example, the articles to be treated may be contained in a rotating perforated drum through which the Sherardizing mixture in a heated condition is allowed to pass. Alternatively, the Sherardizing mixture may be contained in a closed vessel adapted to be heated and when the desired temperature has been attained to be brought into proximity with another vessel containing the articles for treatment, to which the Sherardizing mixture is then transferred by withdrawal of a shutter or its equivalent such as a plug, the mixture being subsequently returned to the heating vessel after the coating process has been carried out for a suitable period.

The composition of the Sherardizing mixture will be varied in accordance with the nature of the material to be treated and with the final effect desired. For example, in the coating of iron or steel if zinc dust be employed a matt surface similar in appearance to a sand-blasted sur-

face results; if, however, arsenic or phosphorus, which may be in the form of zinc phosphide powder, be mixed with the zinc powder or dust, with or without mica or talc powder, a bright lustrous coating of zinc is produced. A suitable proportion of arsenic or phosphorus to ensure this effect is about one-half per cent of the weight of the zinc powder with which it is mixed. Another compound suitable for treating iron or steel is constituted by chromium powder. This is preferably prepared by the electro-deposition of chromium in a finely divided state, which may then be used, with or without the addition of some inert material such as mica or talc, with the result that the chromium combines with the iron or steel to form a protective coating at a cost which compares very favourably with the manufacture of iron- or steel-chromium alloys.

In order that the invention may be clearly understood and readily carried into effect, it will now be described more fully with reference to the accompanying drawing which illustrates, by way of example, various forms of apparatus suitable for carrying out the improved method, and in which:—

Figures 1 and 2 illustrate forms of apparatus in which the articles to be treated are located in a revolving perforated drum through which the heated Sherardizing mixture is adapted to be passed.

Figures 3, 4 and 5 illustrate a form of the invention in which the Sherardizing mixture is heated in one vessel and is then transferred to another vessel containing the articles to be treated.

Referring to Figure 1, the apparatus comprises a drum 1 having perforations around its periphery and adapted to be rotated about its longitudinal axis, means, such as a removable end cover, being provided whereby the articles to be Sherardized may be inserted into or withdrawn from the drum. Alternatively, the drum as a whole may be removable from the apparatus and readily replaceable by a duplicate drum. The Sherardizing mixture is allowed to fall on to the outer surface of the drum from a conduit 2 containing an electric or other heating apparatus 3 for raising the temperature of the Sherardizing mixture to the desired degree. The Sherardizing mixture is maintained in contact with the drum 1 by means of a casing 4 which surrounds the latter, and, owing to the perforations in the drum, a large proportion of the mixture will pass through the drum and come into contact with the articles contained therein. The mixture then

leaves the casing 4 by means of a conduit 5 in which a second heating apparatus 6 may be located, the rate of flow of the mixture through the casing 4 being regulated by shutters 7 and 8. The conduit 5 opens into a casing 9 surrounding a bucket or other form of elevator 10 by which the mixture is redelivered to the conduit 12 and again passed through the casing 4 and drum 1. When the Sherardizing process has been completed the shutters 7 and 8 may be closed and the articles removed from the drum and replaced by a fresh supply. Alternatively, as above stated, the drum itself together with the articles which have been treated may be replaced by a duplicate drum containing a fresh lot of articles.

Figure 2 depicts an apparatus operating on a principle similar to that shown in Figure 1, the main difference lying in the fact that, after delivery from the elevator 10, the Sherardizing mixture is passed along a substantially horizontal portion of the conduit 2 by means of a worm 11, the heating taking place during its passage along this portion by means of an external gas or other heater 12.

Referring to the apparatus illustrated in Figures 3, 4 and 5, this consists essentially in a heating chamber 22 mounted upon a hollow spindle 23 supported in trunnions 24 and adapted to be rotated by such means as a sprocket wheel 25 for engaging a driving chain. The container 22 is provided with baffle plates 26 and with an aperture 27 adapted to be closed by a conical or like shutter 28 fitted to a spindle 29 passing through the shaft 23 and provided with a handle 30 whereby the shutter 28 may be projected into or withdrawn from the aperture 27. The Sherardizing mixture is introduced into the container 22 and is initially heated by such means as a gas burner 31, Figure 3. When the desired temperature has been attained the burner 31 is removed and the container is swung about its trunnions 24 into the position indicated in Figure 4 in which the aperture 27 registers with the opening of a chamber 32 adapted to contain the articles to be treated and to which the container 22 is adapted to be attached by such means as clamps or the like 33. The chamber 32 containing the articles to be treated having been thus fixed in position below the container 22 as indicated in Figure 4, the shutter 28 is withdrawn so that the Sherardizing mixture is allowed to fall into the chamber 32. As indicated, this chamber is lagged and coils 34 are arranged to convey the heat of the chamber with as little external radiation as possible for the purpose of initially heating the articles to be treated and of maintaining them and the Sherardizing mixture at the desired temperature, such heating coils not intended for actually raising the temperature of the mixture. The container 22 and chamber 32 are then rotated by the spindle 23 so as to agitate the articles and the mixture, being preferably for this purpose restored to the horizontal position indicated in Figure 3. After the process has been completed the container and chamber are swung to the position shown in Figure 5, whereby the Sherardizing mixture returns to the container 22, the articles which have been treated, however, being retained in the chamber 32 by such means as a perforated screen 35. It will be seen that the temperature of the Sherardizing mixture has been maintained by means of the heating coils 35 and hence it is possible immediately to proceed with the treat-

ment of a fresh set of articles contained in a duplicate chamber 32 which may be clamped to the container 22 immediately after removal of the chamber which has been first used.

The articles or wire or the like to be treated may be previously or subsequently subjected to any suitable process having for its object to produce a desired effect, such for example, as annealing or tempering.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In apparatus of the class described for protecting metallic surfaces from corrosion by the process known as Sherardizing means for maintaining the Sherardizing mixture without substantial loss of heat during insertion or withdrawal of the articles to be treated, comprising a revolving chamber in which the articles to be treated are located and an instrumentality for introducing the Sherardizing mixture into and withdrawing it from the said chamber.

2. Apparatus for protecting metallic surfaces from corrosion by the process known as Sherardizing, comprising a revolving perforated drum in which the articles to be treated are located, an airtight casing surrounding the said drum, inlet and outlet conduits communicating with the said casing, an airtight casing communicating with each of said conduits, and conveying means for transferring the said mixture from the said outlet conduit to the said inlet conduit.

3. Apparatus for protecting metallic surfaces from corrosion by the process known as Sherardizing as in claim 2, including means for heating the said mixture in at least one of the said conduits.

4. Apparatus for protecting metallic surfaces from corrosion by the process known as Sherardizing, comprising a revolving perforated drum in which the articles to be treated are located, an airtight casing surrounding the said drum, inlet and outlet conduits communicating with the said casing, a shutter between each of the said conduits and the said casing, an airtight casing communicating with each of said conduits, and conveying means for transferring the mixture from the outlet conduit to the inlet conduit.

5. Apparatus for protecting metallic surfaces from corrosion by the process known as Sherardizing, comprising a revolving chamber in which the articles to be treated are located, means for introducing the Sherardizing mixture into and withdrawing it from the said chamber, and means for heating the said mixture when it is not contained within the said chamber.

6. A method of protecting metallic surfaces from corrosion by the process known as Sherardizing, which consists in placing the articles to be treated in a receptacle, introducing the Sherardizing mixture into said receptacle, withdrawing the mixture from the said receptacle prior to the removal of the coated articles, and applying heat sufficient to raise the said mixture to the operative temperature only when the mixture is outside the said receptacle.

7. A method of protecting metallic surfaces from corrosion by the process known as Sherardizing, which consists in placing the articles to be treated in a receptacle, introducing the Sherardizing mixture into said receptacle, withdrawing the mixture from the said receptacle prior to the removal of the coated articles, and applying heat sufficient to raise the said mixture to the opera-

tive temperature to the mixture only prior to its introduction into said receptacle.

8. A method of protecting metallic surfaces from corrosion by the process known as Sherardizing, which consists in placing the articles to be treated in a receptacle, introducing the Sherardizing mixture into said receptacle, withdrawing the mixture from the said receptacle prior to the removal of the coated articles, supplying heat sufficient to raise the mixture to the operative temperature only subsequently to its removal from the said receptacle and re-introducing the

said heated mixture into the said receptacle, and preventing contact of the mixture with the air during said withdrawal, during the heating operation, and during the re-introducing operation.

9. Apparatus for protecting metallic surfaces from corrosion by the process known as Sherardizing as in claim 2, including means for heating the said mixture in at least one of the said conduits, the said heating means being contained within the said conduit.

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