

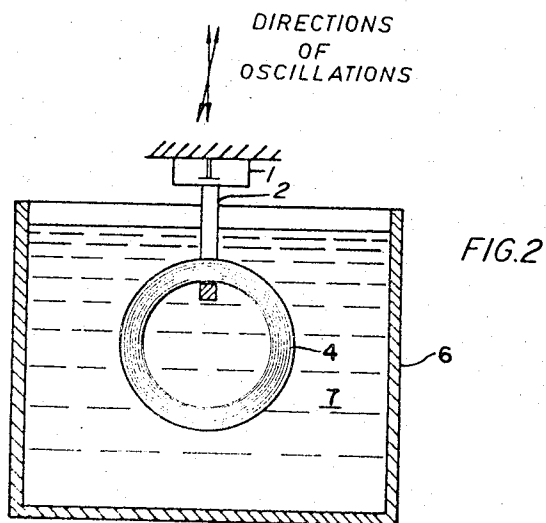
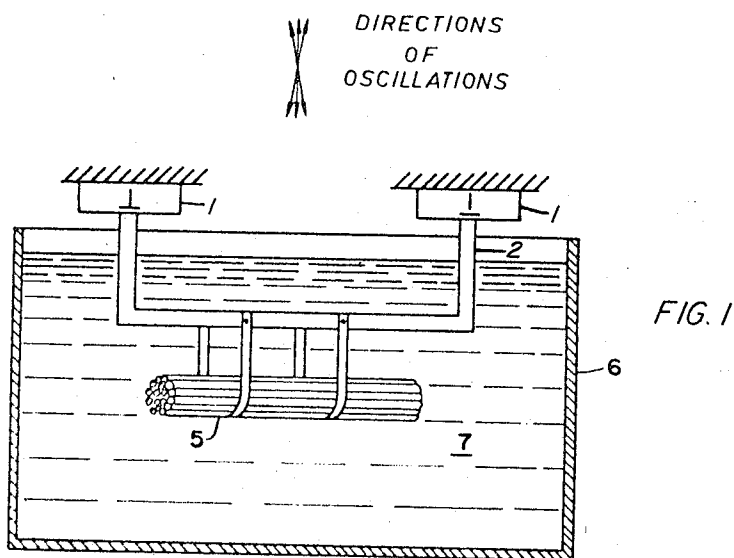
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PROCESS FOR PICKLING BUNDLED MATERIALS

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## PROCESS FOR PICKLING BUNDLED MATERIALS

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20 Claims

### ABSTRACT OF THE DISCLOSURE

The lengthy pickling time of bundles of wire, band, rods and pipes results because pickling solution penetrating into the interstices of a bundle renews itself only by diffusion. Those parts of a bundle characterized by line or surface contact between its individual elements determine its pickling time. According to the invention, the pickling time of a bundle is considerably reduced by excitation of characteristic vibrations in the bundle by means of mechanical oscillators. Permanent contact between individual elements is eliminated. Pickling solution within the bundle is continually exchanged with that outside the bundle. Other wet processes, such as coppering, are improved.

The present invention relates to a process for pickling and other treatment of wire, tubes, rods and other elongated materials which are subjected to a bath for pickling or other operations in bundles.

The objects of the invention are:

To avoid the necessity of opening of bundles of the above types of products, in order to obtain efficient pickling;

To provide a method for continuously bringing fresh pickling solution into intimate contact with the bundled product;

To shorten the necessary time of exposure of the product to the pickling bath and obtain uniform pickling of the product;

To free the surfaces of the product simultaneously from scale and thereby obtain a uniform pickling of all surfaces;

And to clear the treated product of clinging pickling chemicals more effectively.

Other objects and many advantages of the invention will become apparent to those skilled in the art, after a study of the following detailed description, in connection with the accompanying drawings.

FIGURES 1 and 2 are views partly in perspective of an example only of an apparatus of the invention.

The product, for example, coils of wire or bundles of pipe, is hung on a yoke that is in turn attached to an oscillating device, so that the product is subjected to specific instantaneous oscillations while being treated. The frequency of oscillation is chosen to match various possible characteristic frequencies of the product which is being subjected to treatment. The various sections of the product have different characteristic frequencies and thus respond differently to the particular instantaneous frequency, thereby producing relative movements between parts of the product that otherwise lie in contact when at rest.

The product on the oscillating yoke is lowered into a pickling path or a bath for other processes such as rinsing, washing, neutralizing, phosphating or plating. The oscillating movement of the product taught by the present invention simultaneously removes scale from it uniformly.

Examples of oscillators usable are eccentric oscillators

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and magnet vibrators. These are adjusted according to the amount and size of the product being treated. For example, coils of wire of small wire diameter and large coil diameter have a small characteristic frequency. If the product has very different characteristic frequencies, a whole range of frequencies is continuously and repeatedly passed through in order to excite the differing characteristic frequencies of the various elements of the product.

The oscillators preferably are rigidly attached directly on both sides of a yoke. In this case, the yoke, together with the product and the oscillators, is moved from bath to bath.

Another possibility is to attach the oscillators fixedly on the front of the baths and to attach the yoke for example by an eccentric during the time of pickling.

Operation of the device of the invention in rinsing baths improves removal of the pickling chemicals after treatment.

Normally, the oscillatory movement involves alternating movement vertically upwards and downwards. A further development of the invention is to effect oscillation in a direction deviating several degrees from the vertical. In this way, the nodes of oscillation move relative to the bands and bundles of the product and a shorter pickling time is achieved. For example, if the ground frequencies of wire coils or rod bundles are excited, then the points of suspension become nodes. A smaller pickling time is obtained in this case of the product is moved at its point of suspension. The plane of the coils or bundles must coincide with that formed by the direction of oscillation and the vertical.

The method is suitable for treatments other than pickling. It is applicable for steels, both alloyed and unalloyed, and to non-ferrous metals for example in baths of hydrochloric acid, sulfuric acid or other etchants. It is also applicable for the pickling of stainless and heat-resistant steels in for example nitrichydrofluoric acid pickling baths and for treatments in salt baths.

FIGS. 1 and 2 each show a partially perspective view of an example only of an embodiment of the invention. At least one oscillator 1, having a power rating of 7.5 kw. and a frequency of 50 cycles per second is used. The oscillations are directly transmitted to the yoke 2, which supports coils 4 and bundle 5 of Siemens-Martin steel having 0.5% manganese. Coils 4 as shown each have 500 kg. of 7 mm. diameter wire and bundle 5 contains 250 kg. of 5 mm. wire. A greater number of coils may be treated simultaneously. Bath 7 in container 6 employed was a 20% hydrochloric acid solution at 30° C. This embodiment cuts pickling time to 1/5 that required when no oscillator is present. It will be noted that coils 4 and bundle 5 are supported with substantially point contact.

Conventional oscillators known to the art, such as for instance those employed in shaking of paints, however with controllable frequencies and directions of oscillations, may be employed as oscillators of the yoke. The various directions of oscillations are shown in the drawing diagrammatically.

It should be understood of course, that the foregoing disclosure relates to only preferred embodiments of the invention and that it is intended to cover all changes and modifications of the examples of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention set forth in the appended claims.

The invention claimed is:

1. A process for pickling and similar treatment of wires, tubes, rods, columns, and other profiled, elongated pieces, tied into bundles, comprising the steps of immersing each bundle into a bath and subjecting said bundles to oscillations of a frequency the same as the characteristic frequency of the single pieces in the bundles.

2. A process as claimed in claim 1, selecting the frequency of oscillation of said bundles at not more than about ten times of the characteristic frequency.

3. A process as claimed in claim 1, keeping the frequency of oscillation steady within a predetermined selective oscillation range having upper and lower limits corresponding to the characteristic frequencies of the treated material.

4. A process as claimed in claim 1, providing oscillation within the frequency of 5 to 500 cycles.

5. A process as claimed in claim 1, said bath being a gas-developing medium.

6. A process as claimed in claim 1, said bath being liquid and including acid.

7. A process as claimed in claim 1, said oscillations being provided mechanically.

8. A process as claimed in claim 1, said oscillations being provided magnetically.

9. A process as claimed in claim 1, the oscillations being provided simultaneously in a plurality of frequencies.

10. A process as claimed in claim 1, said bath being continuously replenished on the surface of the material.

11. A process as claimed in claim 1, said bath being gaseous and continuously circulated.

12. A process as claimed in claim 1, the material being immersed in a sequence of baths, the composition of each bath being different.

13. A process as claimed in claim 1, said oscillations being stepwise changed within the desired oscillating limits.

14. A process as claimed in claim 13, passage through said limits being repeated.

15. A process as claimed in claim 1, providing the oscil-

lation at an angle away from the vertical onto the material to be treated.

16. A process as claimed in claim 15, said angle being between 1 and 10°.

17. A process as claimed in claim 16, providing coincidence of the plane of the bundle with the plane formed by the direction of oscillation and the vertical.

18. An apparatus for pickling and similar treatment of wires, tubes, rods, columns and other profiled, elongated bodies in bundles comprising:

an open-top container;

a yoke suspended into said container, means to oscillate said yoke;

said yoke shaped to receive and hold said bodies substantially with point contact in bundles with means to avoid shaking them off, said yoke during oscillations.

19. An apparatus as claimed in claim 18, said means to oscillate including means to oscillate said yoke in the vertical direction.

20. An apparatus as claimed in claim 18, said means to oscillate including means to oscillate said yoke in a direction away from vertical.

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