

Nov. 17, 1959

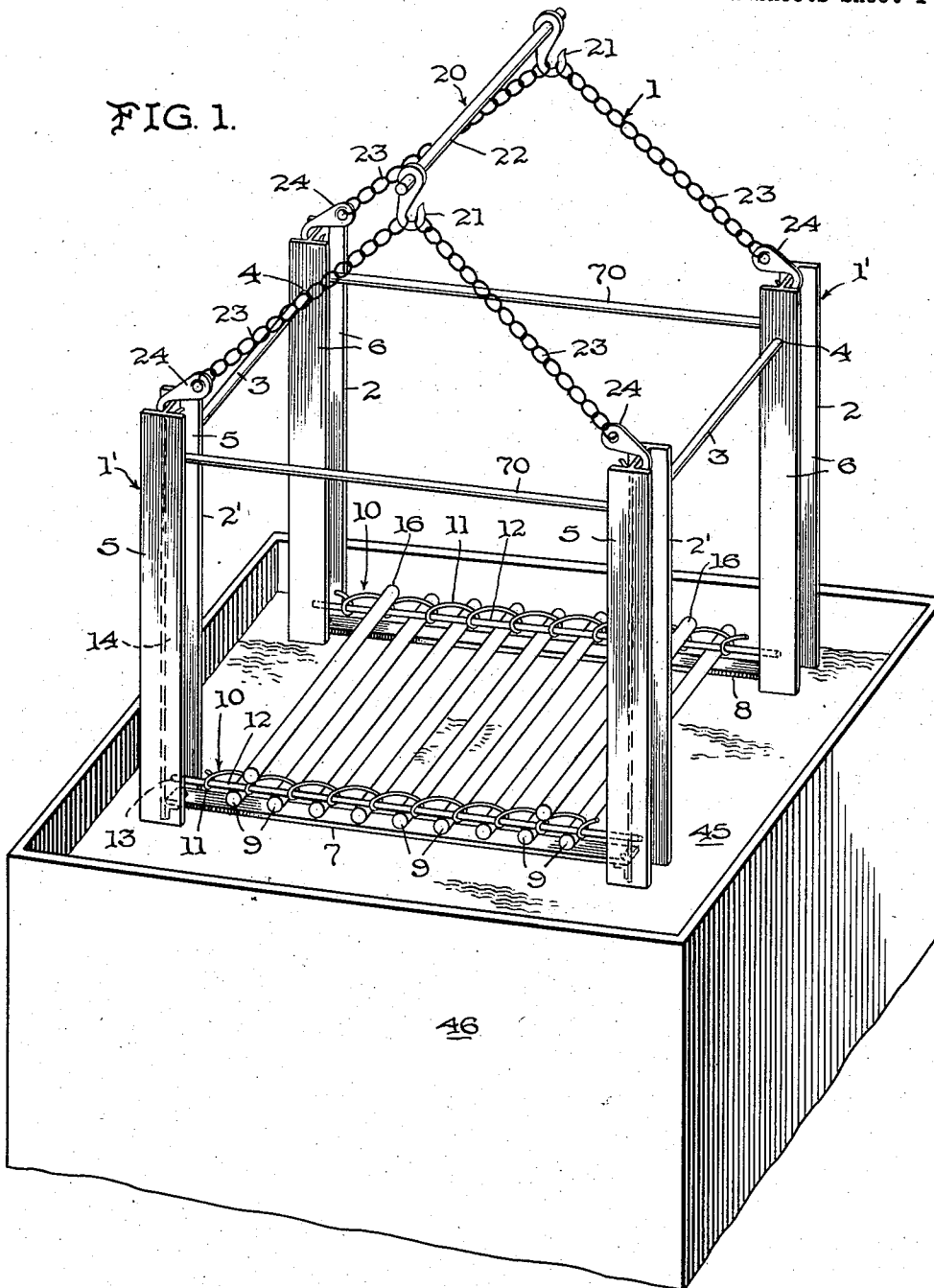
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2,913,125

ARTICLE HOLDER

Filed May 21, 1954

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 2.

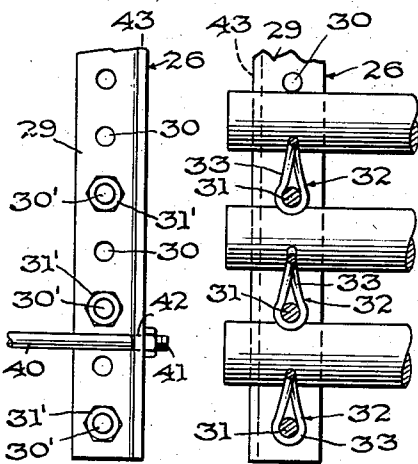
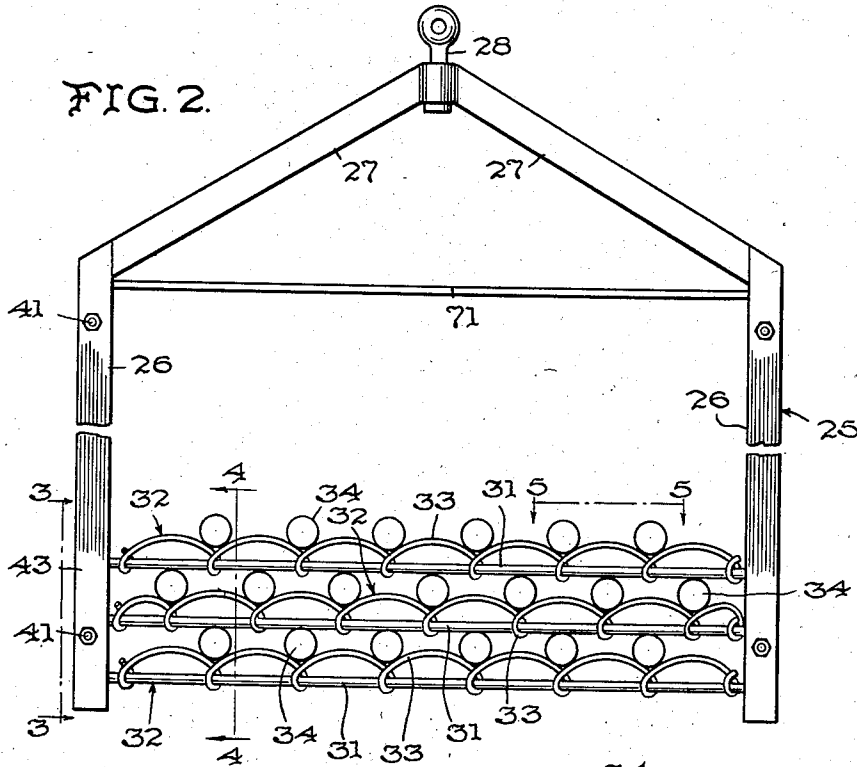


FIG. 3.

FIG. 4.

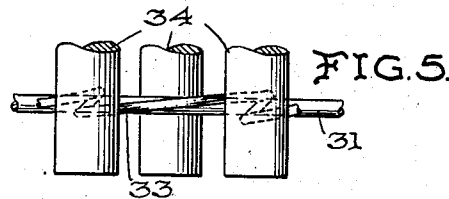


FIG. 5.

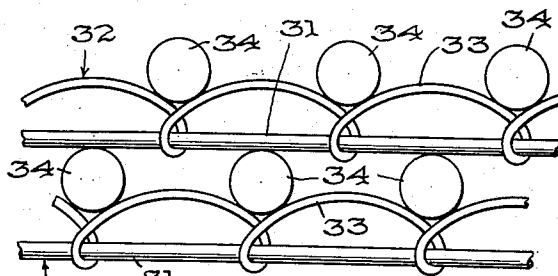


FIG. 6

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2,913,125

ARTICLE HOLDER

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Application May 21, 1954, Serial No. 431,470

4 Claims. (Cl. 211—60)

This invention relates to an apparatus for use in suspending and immersing articles in a liquid solution. More particularly, it is concerned with providing a novel apparatus for use in suspending and immersing one or more layers of forging rods in an etching solution, whereby the forging rods will not only be properly suspended in the solution, but the surface areas thereof will also be exposed the maximum amount to the etching solution.

In the fabrication of various forging rod stock, such as that made out of aluminum, it is the customary practice prior to using the stock to subject the rods to immersion in a caustic etching solution to determine whether any defects, such as seams, cracks, etc., are present in the metal. This caustic etching preferentially attacks defective areas enlarging them to such an extent that they then can be easily detected by the naked eye.

Various devices have been proposed heretofore for the purpose of suspending the rods within the solution. These devices, however, have not proven entirely satisfactory primarily because they were so constructed that large surface areas of the rods were in direct contact with portions of the suspending devices or each other during the period the rods were engaged by the suspending devices. As a result, it was not always possible to obtain the maximum amount of exposure of the forging rod surface areas to the solution during the immersion of the rods therein.

Accordingly, it is a primary object of this invention to provide a novel apparatus for suspending and immersing rod-like members, such as forging rods, within a liquid solution, whereby maximum amount of exposure of the rod surfaces to the solution can be effected.

It is another object of this invention to provide a novel apparatus for suspending forging rods and the like within a caustic etching solution, whereby the maximum amount of exposure of the rod surfaces to the solution can be effected, and whereby the rods may be suspended within the solution in the form of one or more separated layers.

It is another object of this invention to provide a novel apparatus for suspending a plurality of forging rods and the like in an etching solution, whereby the individual rods in one or more layers will be effectively separated one from another while they are suspended in the solution.

It is another object of this invention to provide a novel cradle-like apparatus for suspending a plurality of forging rods in an etching solution, which apparatus is provided with novel means, both for anchoring the individual rods securely to the cradle-like apparatus with a minimum amount of contact between the rods and the cradle-like apparatus and while at the same time separating the rods from each other.

It is another object of this invention to provide a novel cradle-like apparatus for suspending a plurality of forging rods in an etching solution which is so constructed that

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the rods may be easily placed upon or removed therefrom.

It is another object of this invention to provide a novel cradle-like frame assembly having support means, and helical spring means for suspending a plurality of forging rods and the like in a caustic etching solution, while at the same time effectively separating the individual rods one from another.

In an advantageous embodiment of the invention, these and other objects are accomplished by providing an apparatus for use in immersing and suspending a plurality of rod-like members in a liquid solution, such as a caustic etching solution comprised of the combination of a cradle-like frame assembly. This cradle-like frame assembly includes a pair of spaced end frame sections. Each frame section may be advantageously provided with a supporting member. This supporting member in turn may be surrounded along substantially its entire length, by a helical spring element. When the forging rod members are mounted directly upon the helical spring element crosswise thereto and between the individual windings thereof, the rods will be effectively separated one from another, so that a maximum amount of exposure of the rods to the solution can be effected during the immersion of the rods in the solution.

Other objects and advantages of the instant invention will become more apparent from a review of the following detailed description when taken in conjunction with the appended drawings, wherein:

Figure 1 is a perspective view of one form of cradle-like frame assembly which may be employed for suspending rod-like members or forging stock members in a suitable caustic etching solution;

Figure 2 is a broken end view in elevation of a modified type of end frame section that can be used in making up a cradle-like frame assembly;

Figure 3 is an enlarged side view of a portion of the frame section shown in Figure 2, when taken along lines 3—3 thereof;

Figure 4 is an enlarged sectional view taken through layers of forging rods located on the frame member of Figure 2, when taken along lines 4—4 thereof;

Figure 5 is an enlarged plan view partially broken of a portion of the layers of forging rods located on the frame member disclosed in Figure 2, and when taken along lines 5—5 thereof; and

Figure 6 is an enlarged end view of a portion of the stacked forging rods disclosed in Figure 2, and indicates the novel arrangement for stacking layers of rods one upon the other, while at the same time exposing the maximum amount of rod surface area to the caustic etching solution.

With further reference to the drawings and particularly Fig. 1, the apparatus for suspending a plurality of forging rods in an etching solution in such a way that a maximum amount of surface area of the rods can be exposed to the caustic etching solution is generally comprised of a cradle-like frame assembly 1. This cradle-like frame assembly is advantageously made in the form of two spaced end frame sections 1'.

As indicated in Fig. 1, the front end frame section 1' is comprised of the side posts or members 2', which may be in the form of I-beams, and a bottom plate 7 affixed to the lower extremities thereof. The rearward end frame section 1' in turn is similarly constructed and comprised of side posts or members 2 also in the form of I-beams and a bottom plate 8. The two front I-beam members 2' are suitably connected to the rearward I-beam members 2 of the cradle-like frame assembly 1 through the medium of the bridging elements 3. These bridging elements may be provided with suitable threaded end portions at the

opposite extremities thereof which are insertable within suitable openings 4 in the flanges 5 on the I-beam members of the front end frame section and the flanges 6 on the I-beam members of the rearward frame section.

A bottom layer of forging rod members 9 is adapted to be arranged crosswise upon the supporting plates 7 and 8 in such a manner that the ends of the rods will be supported by the plates 7 and 8 of the front and rearward frame sections 1'. After the forging rods 9 of the bottom layer have been suitably disposed upon and between the supporting plates 7 and 8, a suitable spacer or separating unit 10 comprised of a helical spring member 11 and the reinforcing rod 12, which is thrust through the helical spring member 11, is then superimposed upon the bottom-most layer of rods at each end thereof and adjacent a frame section 1'. If desired and for the purposes of anchoring the spacer element to a frame section 1', it is also contemplated that suitable threaded apertures 13 may be located in the web 14 of each of the I-beam side posts 2 and 2' so that the exteriorly threaded ends of the reinforcing rod element 12 can be inserted and locked therein by bolts (not shown). After the separating element 10 has been located above the first layer of rods 9, a second layer of rods consisting of the individual rods 16 is then disposed directly upon the helical spring member 11 and between the individual windings thereof. It is also to be noted that the individual windings of the helical spring member 11 are somewhat flattened between the points where the spring member is in direct contact with its associated reinforcing rod member 12 to provide suitable spacing of the rods 16 from each other.

It will thus be observed by referring to Fig. 1 that each separating unit 10 consisting of the reinforcing rod 12 and the helical spring member 11 not only serves to separate the individual rods in each layer from one another, but the separating unit 10 also advantageously serves to separate the individual rods in one layer from those in adjacent layers.

Although two layers of rods are disclosed in Fig. 1 as being carried by the cradle-like frame assembly 1, it is obvious that any number of layers of rods can be advantageously built up on the frame assembly 1 by the utilization of a plurality of separating elements 10. It will also be noted that the rods 16 of the second layer contact the helical spring member 11 at only two points so that minimum point to point contact is had between the means for suspending the rods and the outer surface of the rods. As a result, the maximum amount of surface area of the rods is available for immersion and exposure to the caustic etching solution.

When additional layers of forging rods are placed upon the first layer of rods, it is not necessary for the separating units 10 to be anchored to the frame assembly as described above, since the additional layers of rods will accomplish this. Any suitable hoisting means may be employed for lifting the cradle-like frame assembly 1 and layers of forging rods 9 and 16 into and out of the etching solution 45 in the tank or container 46. As indicated in Fig. 1, this may be comprised of suitable bail or hoisting means 20. Hoisting means 20 in turn is comprised of the hooked elements 21 connected to a suitable bar 22, which in turn may be attached to an overhead crane. The hooked elements 21 in turn are adapted to grasp the chain members 23 affixed to the upper extremities of the several I-beam members 2 and 2' by means of the hooked elements 24. A reinforcing bridging member 70 may also be used to tie the I-beams of each end frame section together.

By referring to Figs. 2-6, a modified and preferred type of end cradle frame section 1' is disclosed, it being understood, of course, that two such sections would be used in the manner indicated in Fig. 1. The modified cradle-frame section 25 may be comprised of two upright members 26 and diagonal bracing members 27, all of which may be in the form of angle irons. Affixed to the upper

part of the frame section 25 is a bail hook element 28 which in turn is attachable to a suitable hoisting member.

The inside flange 29 of each of the angle iron members 26 is advantageously provided, as indicated in Fig. 3, with a plurality of spaced openings 30. The opposing threaded ends 30' of the reinforcing rods 31 of each of the separating units 32 about which an elongated helical spring member 33 is arranged, is adapted to be inserted and locked in these openings 30 by means of nuts 31'. It will thus be seen that when a plurality of the separating units 32 is attached in the manner described to a frame section 25, and a pair of the cradle-like end frame sections 25 is arranged in spaced relationship to each other and tied together, that one or more layers of forging rod elements 34 may then be suitably supported between the two frame sections 25 forming a cradle-like frame for immersion in a solution of caustic etching. In addition, suitable tie members or bridging members 40 may be employed for the purpose of securing the individual frame sections 25 together when the opposing threaded extremities 41 of the members 40 as indicated in Fig. 3 are inserted and locked in suitable threaded openings 42 on the exposed flange 43 of the angle members 26.

It will also be noted by referring particularly to Figs. 2 and 6 that in the case of the modified frame section member 25 of the cradle-like frame assembly 1, the lowermost spacing element 32 not only serves to separate the individual rods in the various lower layers from each other, but in addition, also serves as the main support for the layers of the rods. In this case, it is not necessary to employ a separate supporting plate or element such as supporting plates 7 and 8 as indicated in Fig. 1 for the cradle-like frame assembly 1.

The arrangement of the forging rods 34 on the helical spring elements 33 of the spacing units 32 also provides for a minimum amount of contact between the suspension device or cradle-like frame assembly 1 and the forging rods. As a result, a maximum amount of rod surface area can be exposed and covered by the caustic etching solution 45. Finally, the individual wrappings of the helical spring members 33 of Figs. 2-6 and 11 of Fig. 1 prevent the forging rods in each layer of forging rods from moving or being displaced on the cradle-like frame assembly 1. A reinforcing bridging member 71 may also be used to reinforce and tie the angle members 26 of the end frame sections together.

Although advantageous embodiments of the instant invention have been shown and described, it is obvious that various changes and modifications may be made therein without departing from the spirit and scope thereof as defined by the appended claims, wherein what is claimed is:

1. A device for use in suspending metal articles in a treatment bath comprising a plurality of horizontally spaced side members, means connecting said side members to each other in a fixed relationship so as to define a cradle-like frame assembly, vertically spaced article support means arranged parallel to each other and disposed between said side members on each of two sides of said cradle-like frame assembly, said article support means including an elongated rod member and an elongated helical spring element surrounding said rod member and reinforced against vertical sagging thereby, each of said rod members being disposed in a fixed relation with respect to said side members defining said cradle-like frame assembly, each of said helical spring elements being wound about its associated rod member in such a fashion that somewhat flattened portions will exist thereon between the points where the helical spring element is in direct contact with its associated rod member whereby articles to be treated can be supported upon said helical spring element in spaced relationship to each other while maintaining a minimum contact between the articles and the cradle-like frame assembly and whereby a maxi-

imum exposure of the articles to the treatment bath can be effected.

2. A device as recited in claim 1 wherein said cradle-like frame assembly includes rigid support means in engagement with at least two of said side members so as to define a lower article support and frame assembly reinforcing means.

3. A device as recited in claim 1 where at least the lowermost of said reinforcing rod members is fixedly secured to two of said side members.

4. A device as recited in claim 1 wherein said article support means are removably mounted on said cradle-like assembly.

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