April 12, 1932. J. D. WILLIAMS 1,853,888

APPARATUS FOR PICKLING

Filed Feb. 18, 1931

Fig. 1.

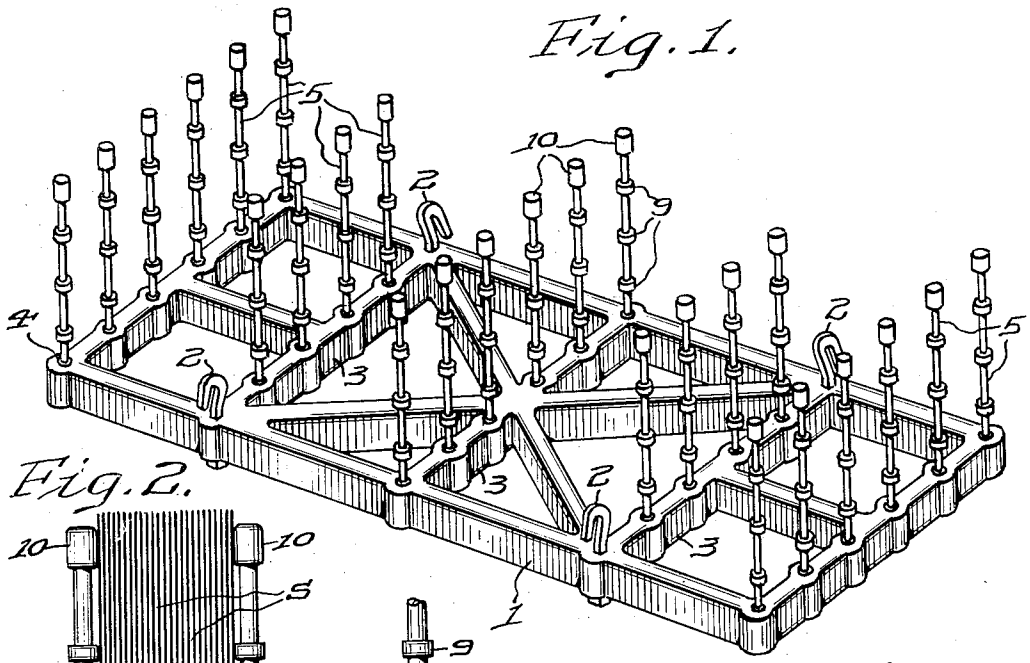


Fig. 2.

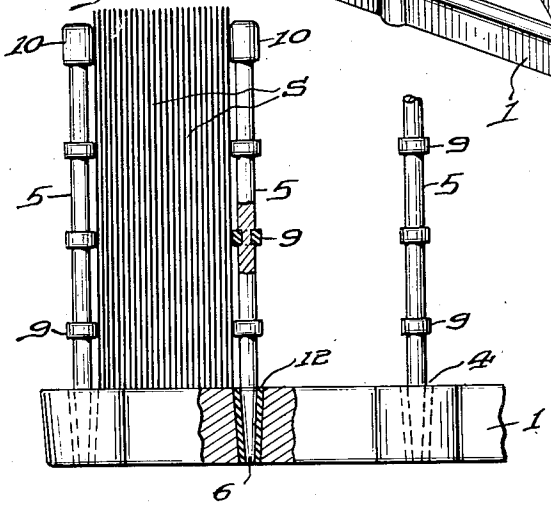


Fig. 3. Fig. 4.

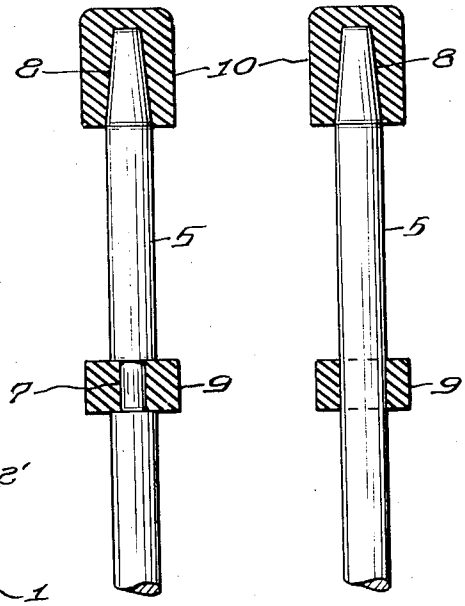
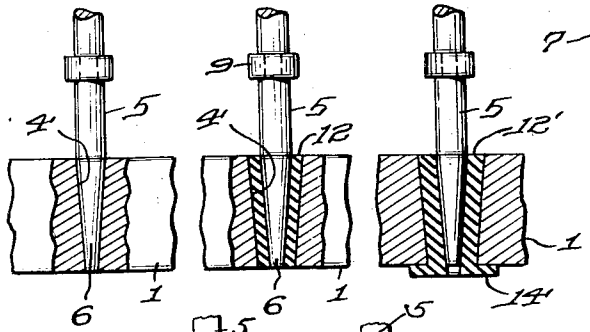


Fig. 5. Fig. 6. Fig. 7.



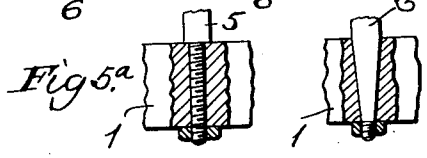


Fig. 5a. Fig. 5b.

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Patented Apr. 12, 1932 1,853,888

UNITED STATES PATENT OFFICE

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APPARATUS FOR PICKLING

Application filed February 18, 1931. Serial No. 516,540.

My invention relates to the pickling of ferrous sheets and other articles during the course of their manufacture for the purpose of freeing them from scale and more particularly to the pickling crates ordinarily employed in sheet mills and the like for supporting the sheets or other metal products in the pickling tank in which they are subjected to the action of a pickling solution.

It has heretofore been the practice to employ for such purposes a pickling crate comprising a grid or base in the form of a relatively heavy casting having suitable holes adapted to respectively receive a plurality of pins known as pickle pins which are maintained in upright position therein and which provide lateral support to the sheets when disposed edgewise on the grid or base. The holes in the grid are usually tapered and the ends of the pins correspondingly tapered so as to hold the latter firmly in position but to permit them to be readily withdrawn when desired, the pins being customarily made of bronze, Monel metal, or other acid resistant metallic compositions which are not attacked by the pickling solution.

When crates of the character just described are employed for pickling sheets, some of the latter may, and usually do, rest against the pins so that when the pins are of different metallic composition from the sheets and in the presence of the acid pickling solution, a galvanic action is produced between the pins and those sheets in contact therewith which may result in the deposition of copper or other metal on the sheets at or adjacent their points of contact with the pins. Although such deposits are usually initially in the form of comparatively small spots on the surfaces of the sheets, it is customary to further roll the latter after pickling and this operation frequently so enlarges the spots of copper or other foreign metal that they then extend over a relatively large area on the surfaces of the finished sheets and render the latter unfit for many uses requiring surfaces of uniform metallic character. This is particularly true in the case of full finished sheets intended for automobile bodies, fenders, or the like, since such spots usually have a noticeable effect upon enamel, lacquer or other finishes applied thereto; that is, the enamel in the vicinity of each spot has a different appearance from that covering the unspotted portions of the sheet with the result that such spotted sheets cannot be sold for such purposes.

Another disadvantage of pickling crates heretofore used has been that the sheets are frequently subjected to scratching or denting through contact with the pickle pins and the surfaces of the sheets are thus marred in such a way as to detract from their suitability for many uses.

A principal object of the present invention, therefore, is to provide a pickling crate in which the sheets are prevented from metallic contact with the pickling pins, whereby galvanic action between the pins and the sheets when in the pickling tank is avoided.

A further object of my invention is to provide in a pickle crate means which, while enabling the pickle pins to satisfactorily support the sheets in the crate, nevertheless prevent scratching or other damage to the sheets during the pickling process.

Another object of my invention is to provide an improved form of pickling crate in which galvanic action between several parts of the crate itself is avoided even when such parts are formed of different metals whereby the operative life of the crate is thereby substantially lengthened.

A still further object of my invention is to provide an improved pickle pin which is satisfactorily operative to support the material in a pickle crate without the necessity for metallic contact therewith and in which is incorporated means tending to prevent breakage of the pins themselves should they be accidentally dropped upon the floor or upon any other hard surface while being removed from or inserted in the grid of the pickling crate.

My invention further contemplates the provision of a novel method of pickling ferrous articles while supported in a pickling crate embodying parts of non-ferrous metal whereby electrolytic action between the articles and said non-ferrous parts is prevented with resultant avoidance of the deposition

on the articles of spots or areas of a dissimilar metal.

Other purposes, objects and advantages of the present invention are hereinafter more particularly mentioned or will appear from the following description thereof during which reference will be had to the accompanying drawings.

In said drawings, Fig. 1 is a perspective view of one form of pickle crate constructed in accordance with my invention and in which the means for preventing contact between the sheets and the pickle pins are shown in somewhat exaggerated proportions for the sake of clearness; Fig. 2 is an enlarged fragmentary end elevation of the crate, partly broken away into vertical section, and showing a plurality of sheets disposed therein in position for pickling; Fig. 3 is an enlarged fragmentary detail of the upper end of one of my improved pickle pins and Fig. 4 is a similar view showing another form thereof; Fig. 5 is an enlarged fragmentary elevation of the lower portion of one of the pickle pins disposed in its socket in the base or grid of the pickling crate; and Figs. 5*a* and 5*b* are similar views on a reduced scale respectively showing different ways of removably securing the pins in the base. Fig. 6 is a view similar to Fig. 5 but showing one form of means which I may employ for prolonging the life of the pickling crate by avoiding galvanic action between the pins and the base, and Fig. 7 is a view similar to Fig. 6 but showing another form of means adapted for a like purpose. In the several figures, like characters are employed to designate the same parts.

Referring now more particularly to the drawings, the pickle crate shown in Fig. 1 comprises a generally rectangular, elongated base or grid 1 which may be formed as a single casting in the usual way and provided with suitable hooks 2 or other means from which the crate may be supported in the pickling tank. The base comprises a plurality of transverse ribs 3 which are provided with suitable downwardly tapered laterally spaced bores or sockets 4 adapted to receive and support in vertical position the pickle pins 5 hereinafter more particularly described. The sockets 4 and, in turn, the pins, are, as is usual, arranged in parallel rows longitudinally of the base as shown in Fig. 1 and divide the crate into a plurality of sections in each of which a plurality of sheets S may be disposed on edge and thus supported principally on the base, the pickle pins being operative to maintain the sheets in their desired substantially vertical position.

The pickle pins 5 may be made of bronze, Monel metal or other metal suitably resistant to the acid of the pickling bath and possessed of requisite strength, are preferably tapered at their lower ends as at 6, and may be provided with annular depressions 7 at spaced points along their shanks, their upper ends also desirably being tapered, as at 8. The pins are provided with spaced annular collars 9 which may be integrally vulcanized thereto in the annular depressions 7 as best shown in Fig. 3, or may be separately manufactured and slipped onto the pins and vulcanized or otherwise secured to their exterior surfaces, if the depressions 7 are not employed. The collars 9 are preferably formed of rubber but any other suitable, desirably somewhat resilient, and electrically non-conductive material unaffected by the pickling bath may be utilized. Similarly, at the upper ends of the pickle pins I may provide cylindrical caps 10 which may be formed of vulcanized rubber or other suitable non-conductive material and may be vulcanized or otherwise secured in position. In Fig. 4 I have shown a pin devoid of the depressions 7 and having collars of an internal diameter substantially equal to that of the pin vulcanized to its outer surface or even merely slipped onto the pin and retained thereon by friction.

In the sockets 4 in the base I may employ or not, as desired, means to which I have referred for preventing galvanic action between the pins and the base, as it will be understood that when the base and the pins are formed of the same material galvanic action between these parts will ordinarily not take place. When, however, the pins and the base are of different metals, I prefer to employ suitable bushings 12 in the sockets 4, forming the said bushings either integrally or in two or more parts from rubber or any other suitable material effective to electrically insulate the pins from the base when the bushings are inserted in the sockets 4 in the latter and the pins are inserted in the tapered bores in the bushings. Thus, I have shown in Fig. 6 a bushing 12 which comprises merely a tapered sleeve whose length is equal to the length of the bore 4 and which is so proportioned as to fit snugly therein and to provide a centrally tapered bore adapted to receive the tapered lower end of the pin. In other cases the bushing may be vulcanized to the lower end of the pin so as to be removable from the socket therewith.

In Fig. 7 I have shown a somewhat similar sleeve or bushing 12′ provided with an annular flange 14 adjacent its lower end adapted to engage the lower face of the base 1 when the bushing is disposed in operative position therein and to prevent the sleeve from being pulled out of the bore 4 when the pin is removed. When bushings of this form are employed they may be made in separate parts or may be so constructed as to be sufficiently compressible to permit their insertion into the lower ends of the bores.

It is apparent from Fig. 2 that when sheets

are disposed on edge on the base 1, the sheets adjacent the rows of pins are prevented from coming into contact with the metal parts thereof by the collars 9 and the caps 10 and thus the deposition of copper or any other metal constituent of the pins upon the surfaces of these sheets through electrolytic action is avoided. Additionally, as the collars and caps are preferably formed of a resilient material, or at least a material softer than the sheets, contact thereof with the sheets substantially eliminates the danger of scratching or other physical damage to the latter during the pickling operation, in which, as is well understood, the sheets frequently move slightly in one direction or another with respect to the adjacent pins. Moreover, as the collars project somewhat beyond adjacent surfaces of the pins, it is apparent that if the latter are dropped inadvertently to the floor when removing them from or inserting them in the base or in the course of other handling, the shock will be received and largely absorbed by the collars, and the danger of breakage to the pins thereby greatly diminished.

With the crates heretofore in use it has been found that considerable wear takes place between the ends of the pins and the sockets, this wear being supplemented by erosion through electrolytic action when the pins and base are of dissimilar metals. In fact, the enlargement of the sockets from one or both of these causes occasionally permits the pins to entirely pass therethrough and to fall to the bottom of the pickling tank, thereby damaging the latter and sometimes even piercing it, with resultant necessity for extensive repairs as well as danger to the workman from the liberation of the acid pickling solution. By the provision of bushings in the sockets in accordance with my invention, whereby metal to metal contact between the pins and the base is avoided, the wear on the sockets is entirely prevented as well as any electrolytic action between the pins and the base, so that the life of the base is virtually indefinitely prolonged, while when the bushings become so worn after protracted use that they no longer maintain the pins in their proper positions, they can be readily removed and replaced with new ones. As in the crates of this character heretofore employed, the life of the base is generally determined by the amount of wear and/or erosion of the sockets, the employment of the bushings is thus of material value in reducing the expense of base replacement.

It will of course be understood that when my invention is to be utilized for a crate in which the pins are rigidly maintained in the base by means of cooperative threads on the pins and in the sockets as in Fig. 5*a*, or by nuts threaded onto projecting lower ends of the pins as in Fig. 5*b*, the bushings in the sockets will ordinarily be omitted as the elimination of relative movement between the pins and crate substantially negatives the possibility of appreciable wear between the parts.

While I have herein described my invention with considerable particularity and have referred to several embodiments of specific parts thereof, it will be understood that I do not desire or intend thereby to limit or confine myself to any precise details of construction or arrangement as the same are capable of numerous modifications in various particulars if desired without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. A pickling crate of the class described comprising a metallic base having a plurality of sockets arranged in spaced relation and respectively adapted for the reception of pickle pins, and a pickle pin disposed in each of said sockets, each of said pickle pins comprising a metallic shank and spaced collars of electrically non-conductive material disposed thereon and extending beyond the periphery thereof.

2. A pickling crate of the class described comprising a metallic base having a plurality of sockets arranged in spaced relation and respectively adapted for the reception of pickle pins, and a pickle pin disposed in each of said sockets, each of said pins comprising an end extending into the socket, a shank provided with spaced annular recesses and a collar of electrically non-conductive material disposed in each recess and extending beyond the surface of the shank.

3. A pickling crate of the class described comprising a base having a plurality of sockets, electrically non-conductive bushings disposed in said sockets, and pickle pins respectively disposed in said bushings and supported thereby.

4. A pickling crate of the class described comprising a base having a plurality of sockets, electrically non-conductive bushings disposed in said sockets, and pickle pins respectively disposed in said bushings and supported thereby, said pins having annular collars of electrically non-conductive material disposed at spaced intervals thereon.

5. A pickling crate of the class described comprising a base having a plurality of sockets, electrically non-conductive bushings disposed in said sockets, and pickle pins respectively disposed in said bushings and supported thereby, said pins having annular collars of electrically non-conductive material disposed at spaced intervals thereon, and electrically non-conductive cylindrical caps covering the free ends of the pins.

6. A pickle pin of the class described comprising a shank and a plurality of electrically non-conductive collars of greater external di-

ameter than the pins disposed at spaced intervals thereon.

7. A pickle pin of the class described comprising a shank having longitudinally spaced annular grooves and electrically non-conductive collars disposed in said grooves and of greater external diameter than the shank of the pin.

8. A pickle pin of the class described comprising a shank, collars of electrically non-conductive material disposed at intervals on the shank, and a cylindrical cap formed of electrically non-conductive material enclosing one of its ends and intimately secured thereto.

9. In a pickling crate of the class described, a metallic base having a plurality of sockets formed therein and a bushing formed of electrically non-conductive material disposed in each of said sockets.

10. A pickling crate of the class described, comprising a base having a plurality of sockets and pickle pins disposed in said sockets and supported by the base, said pins having on at least a portion thereof electrically non-conductive material.

11. In a pickling crate of the class described, a metallic base having a plurality of sockets formed therein and a bushing formed of electrically non-conductive material disposed in each of said sockets, said bushings respectively providing tapered orifices for the reception of the ends of the pickle pins.

In witness whereof I have hereunto set my hand this 5th day of February, 1931.

JOHN D. WILLIAMS.