Sept. 20, 1960 G. VILLETTE 2,953,512

PLATING RACK

Filed Feb. 13, 1959

Fig. 1

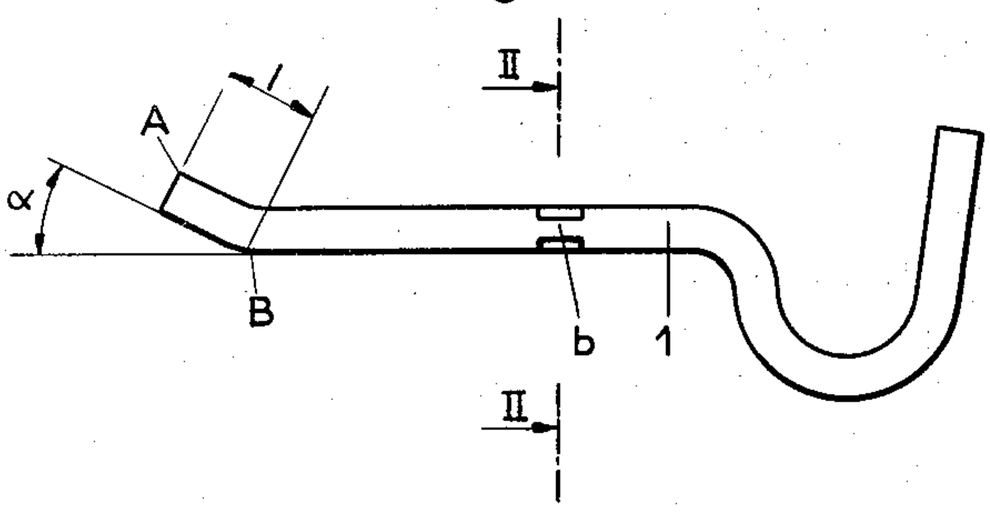


Fig. 2

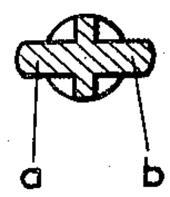


Fig. 3

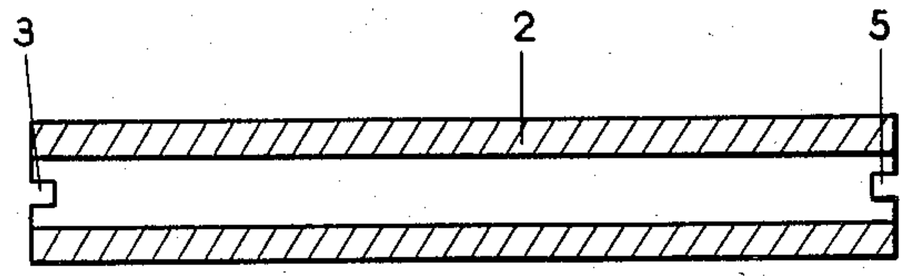


Fig. 4

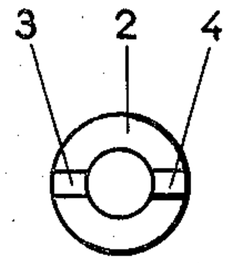
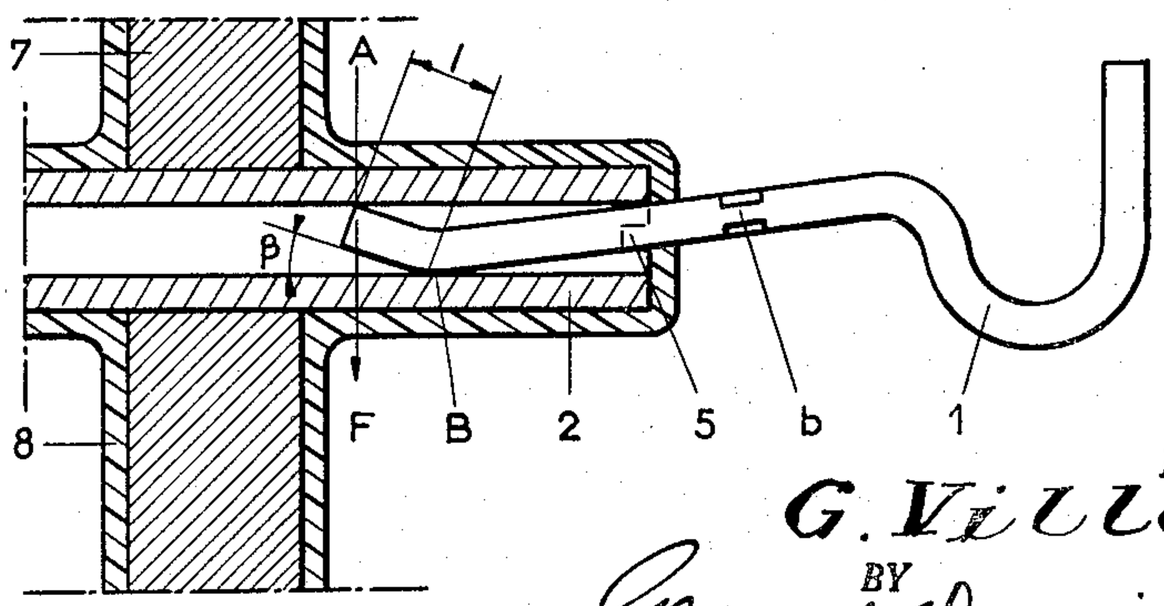


Fig. 5



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2,953,512

Patented Sept. 20, 1960

2,953,512

PLATING RACK

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Filed Feb. 13, 1959, Ser. No. 792,999

Claims priority, application France Feb. 17, 1958

2 Claims. (Cl. 204—297)

The invention relates to racks intended to support the pieces immersed in plating baths and more particularly to racks including a number of sleeves integral with the structure of the rack and wherein are retractably fixed without screws, bolts or nuts pins which carry the pieces to be plated.

Hitherto these pins, made of wire of convenient diameter, were forced into the sleeves in a manner which did not prevent their subsequent rotation, so that when this rotation occurred accidentally the pieces suspended on fell to the bottom of the plating tank. Moreover, the way of securing the electrical contact between the metallic sleeve and the metallic pin did not allow to maintain a convenient electrical contact over a longer period of time, so that after some weeks of functioning this contact became insufficient. Furthermore, the rotation of the pins in the sleeves caused the contact point to move towards surfaces previously oxidized and so to prevent any electrical contact at all.

A first object of the invention is to prevent the rotation of the metallic pin after having been introduced into the respective sleeve.

With this object in view the wire whereof the pin is made is deformed at a proper point of the pin so as to receive two small projections or wings, while the sleeve is provided at its ends with notches wherein the projections or wings of the pin engage when the pin is forced into the sleeve.

A further object of the invention is to secure a good and lasting electrical contact between the pin and the sleeve.

With this object in view the end of the pin which is introduced into the sleeve is bent so as to form an elbow whose angle is determined according to the coefficient of friction of the wire on the sleeve, on one hand, and according to the rate of the interior diameter of the sleeve and the diameter of the wire on the other hand, whereby these two diameters are, of course, to be chosen taking in account the usual working limits for the wire and the sleeve.

Other particular features of the invention will appear from the following description of a preferred embodiment of the invention, it being understood that minor modifications are possible without departing from the scope of the invention.

In the accompanying drawing

Fig. 1 is an elevational side view of a pin according to the invention.

Fig. 2 is a side view of the cross section along line II—II of Fig. 1.

Fig. 3 is a sectional view of a sleeve according to the invention.

Fig. 4 is a side view of Fig. 3.

Fig. 5 is a partial sectional view of the rack showing the assembly of the various pieces and the pin in an intermediary position before its complete introduction into the sleeve.

Fig. 1 shows a side view of the pin. The latter comprises a portion AB of the length **1** bent to form an angle α with the straight portion provided with two small wings *a* and *b*. The pin terminates by a hook which may have any other shape according to the manner in which the pieces to be plated are to be fixed to the pins and according to whether one or more pins are intended to carry a single piece.

Fig. 2 shows a cross section of the wire and its wings. This figure is drawn to a larger scale in order to facilitate the representation. The wings will preferably be obtained by stamping or squeezing out of the wire with a proper tool. But any other method of production may, of course, be applied, always in a manner not to impair the mechanical resistance of the pin to bending stresses.

Fig. 3 shows the longitudinal cross section of the sleeve which consists of a metallic tube **2** provided at each end with notches respectively **3, 4** and **5, 6** applied on a diameter of the endfaces. These notches are preferably located in a same axial plane of the sleeve as shown in Fig. 3.

When the pin **1** is forced into the sleeve **2** through the right hand opening the wings *a* and *b* engage the notches **5** and **6** and the pin is thus prevented to rotate and to slide accidentally further into the sleeve.

Fig. 5 shows the pin under way to be introduced into the sleeve. In this figure the structure of the rack is schematically represented by **7** and the sleeve integral with the structure by **2**. The structure **7** and the sleeve **2** are covered by a layer **8** of plastic material intended to protect them against electrolytical action of the bath wherein they are immersed. This protective layer has convenient openings at the ends of the sleeve allowing the introduction of the pin **1** into the sleeve **2**. When the pin has been forced sufficiently deep into the sleeve its wings *a* and *b* have engaged the notches **5** and **6** and, as already explained now prevent the pin to rotate or slide further into the sleeve. This double blocking has the following advantages: the contact between the pin and the sleeve is maintained always at the same point, no stop within the pin is necessary to limit the inwards movement of the pin, the sleeve therefore can easily be cleaned and in case of break of the pin the portion trapped within the sleeve can easily be removed by pushing it out through the opposite opening of the sleeve.

Designating by F the contact pressure at A between the pin and the sleeve, this pressure will be stronger as the length of the portion AB is made shorter because the flexional moment of the pin is balanced by the moment $F \times l$. Hence the shorter l the higher the contact pressure F.

According to the invention the length l is chosen as short as possible. Taking in account the allowable dimensional limits of the pieces involved the length l will preferably be chosen equal to about twice the diameter of the wire. The elbow should be rounded to avoid a sharp edge liable to modify the coefficient of friction. The shape of the bend will therefore resemble nearly the shape of an **S**. The diameter of the sleeve should be larger than that of the wire so that the bent portion AB of the pin may form with the axis of the sleeve an angle β so as to buttress at the instant where the pin is forced into the sleeve. So, e.g., in the case of a nickel pin and a sleeve of stainless steel, the wire might have a diameter of 1.8 millimeters and the sleeve an inner diameter of 1.9 millimeters. For the considered case however slightly different dimensions may be chosen without leaving the scope of the invention.

The structure disclosed herein provides the shortest current path from the rack structure to the pin when the pin is in its final position within the sleeve. As will be obvious from an examination of Figure 5, when wings *b* are received within notches **5** the current could possibly

flow from such contact, but because of the relatively high resistance of the sleeve the current will flow from the end of the pin, through the sleeve and to the rack structure. This is true when the sleeve is, for example, stainless steel which is, additionally, particularly resistant to oxidation, and thus a long rack life is obtained and a lasting good electrical contact between the sleeves and pins is insured.

Nickel and stainless steel have been cited as a mere example. It is obvious that any other convenient metals may be used. Moreover, if need be, these pieces may be coated by any proper conductive and protective layer, preferably obtained by a process of chemical reduction.

It will be appreciated that in applying the present invention one can obtain with simple and inexpensive means a dependable rack, wherein the pins are fixed without screws, bolts, nuts or the like, these pins being blocked and prevented to rotate or to slide. The electrical contact between the pins and the sleeves is practically constant over a very long period of utilization. The pins and sleeves may be manufactured from conventional tubes and wires. The cleaning of the sleeves is easy to perform as no interior projections exist and the replacement of broken pins can be achieved due to the simplicity of the operation

by unskilled persons and on the spot without having to carry the rack to the repair shop.

I claim:

1. In combination with a plating rack an assembly for supporting an article comprising a sleeve member, a pair of notches formed at the end of said sleeve member, and a pin extending at one end thereof into said sleeve member, said pin having a pair of diametrically opposed wings radiating therefrom and registering with said notches, the pin having a portion of the said end extending into the sleeve member bent to form an angle with the longitudinal axis of the pin, said bent portion having a length about twice the diameter of the pin, the respective ends of said bent portion engaging against respective walls of said sleeve member.

2. The invention as set forth in claim 1, including a layer of protective plastic material covering the rack and sleeve member, the other end of said pin penetrating said material and having a portion bent to receive an article.

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