Surface treatment installation (100) for metallic parts including an electrolytic cell (1) comprising a treatment liquid (20) in which the parts to be treated are immersed, characterised in that the parts to be treated are fixed on a pivoting drum (2) such that there is at least one rotation movement for each part in the cell, and in that the cell (1) comprises at least two electrodes (8a, 8b), while the drum is powered by an electrical power supply with polarity opposite to the electrode polarity, through at least one contact pad that is brought into contact on the drum drive ring.
The present invention relates to an improvement in a process for treating the surface of metal parts by electrolysis and relates more particularly to a continuous electrolysis vat using the principle of immersing the parts and transferring them.

The surface treatment of parts by electrolysis is a well-known process that requires the use of an electric current to carry out the treatment.

Electrolysis can be applied to metals, such as anodization of aluminium, anaphoresis, for electrodeposition of paint on aluminum, treatments on steel, such as galvanizing, chromizing, copper plating, nickel plating, cataphoresis, phosphating, and treatments on copper, such as anodization, but also to electrodeposition treatments on nonmetallic parts, such as the electroplating of plastic parts.

According to the conventional electrolysis processes, the parts to be treated are:

either attached to supports placed so as to remain stationary in the electrolysis vat. In this case, an electrical contact, such as for example a copper vee, placed on the edge of the vat enables the current to be delivered to the supports placed on this vee and consequently to the parts. In this process, in order for the electrical contact to remain constant, the supports and therefore the parts must remain stationary. This process cannot therefore prevent the formation of air bubbles, and therefore a lack of treatment in the hollow portions of certain parts, and this results in a lack of homogeneity in the treatment;

or placed loose in electrolysis tanks. In this case, the parts treated en masse are brought into contact with a moving electrode that is placed in the tank. The drawback of this process is that the massed rotated parts become damaged by rubbing against one another.

The invention is therefore to alleviate all or some of the drawbacks of the existing processes and operating installations as mentioned above.

For this purpose, the present invention relates to an installation for carrying out a surface treatment on parts, such as for example hollow parts or other parts, in which process the parts are completely immersed inside at least one treatment vat containing a liquid, characterized in that each hollow part is immersed by making it undergo a rotation movement such that the air bubbles likely to be created inside the vat are expelled from the inner wall of said part.

Thus, the treatment installation for treating the surface of metal parts, according to the invention comprises an electrolysis vat containing a treatment liquid in which the parts to be treated are immersed, and is characterized in that the parts to be treated are fixed to a drum which can pivot so that it makes each part in the vat undergo at least one rotation movement and in that the vat comprises at least two electrodes, while the drum is supplied with electric current of opposite polarity to that of the electrodes by means of at least one contact pad which is brought into contact with the drive ring for driving the drum.

According to a complementary feature, the vat comprises a set of contact pads, such as, for example two times fifteen pads sandwiching the drive ring for driving the drum.

According to another feature, the contact pads are mounted so as to move translationally toward the flanges of the ring and are pressed against the corresponding face of the corresponding sidewall by a resilient system, such as a spring.

According to other features of the invention, the two lateral successions of pads are arranged in the form of a circular arc, having for center the center of pivoting of the drum, whereas each of the contact pads is contacted to a cable or a copper braid connected to the power supply.

It should also be noted that the external periphery of the drum comprises a succession of slideways intended for slidngly receiving the cassettes used to support the parts to be treated and that the slideways are equipped with flexible contact blades that are fixed to the slideways so as to transmit the electrical contact of the slideway to the corresponding cassette and therefore to the parts that are fixed thereto, thus enabling the electrolysis to be carried out.

It should be added that the vat includes a motor for rotating the pivoting drum thanks to the cooperation of a toothed wheel with a succession of pegs, which are mounted so as to be mutually parallel, and between the two flanges of one of the sidewalls of the drum.

According to another complementary feature, the vat has two electrodes connected to either a negative or positive polarity, while the drum is supplied with the opposite polarity, and said electrodes consist of aluminum plates.

Other features and advantages of the invention will become apparent from the following description in conjunction with the appended drawings, which are given merely by way of nonlimiting examples.

FIG. 1 is an end view illustrating the vat of the invention;
FIG. 2 is a top view;
FIG. 3 is a side view; and
FIG. 4 is a view similar to FIG. 1, but without the drum.

According to the process employing the treatment installation of the invention, each part is immersed in at least one vat, making it undergo rotation movement such that the air bubbles likely to be created inside the vat are expelled from the inner walls of said part.

According to the embodiment illustrated, each part is made to undergo a rotation movement through at least 90° and preferably a rotation through 360°.

According to this embodiment illustrated, a specified number of said parts is placed beforehand on a support or cassette (4) which includes at least one holding member for keeping each of them together.

According to this embodiment, the installation for treating the parts, which bears the general reference (100), consists of a vat (1) comprising a drum (2) mounted so as to rotate inside said vat about a horizontal axis (X, Y), the parts to be treated being fixed to said drum.

According to the embodiment illustrated, the drum (2) comprises, on its external periphery, a succession of slideways (3) of axis parallel to the rotation axis of the drum, the slideways being intended to receive, for example by sliding, the cassettes (4) serving to support the parts to be treated.

The cassettes are for example those described in European Patent Application EP-A-1 433 537 and comprise a set of supports for the parts, enabling several parts to be fixed onto a single cassette.

The vat (1) of the invention includes a motor for rotating the pivoting drum (2) thanks to the cooperation of a
toothed wheel (6) with a succession of pegs (7), which are mounted so as to be mutually parallel, and between the two flanges (10a, 10b) of one of the sidewalls (10) of the drum, constituting the drive ring.

The vat (1) has for example two electrodes (8a, 8b) connected to a negative polarity for electrolyzing aluminum parts. It should be noted that these electrodes (8a, 8b) will be connected to a positive polarity in the case of electrolyzing a steel or copper part.

The drum (2) is advantageously made of titanium, but it could be made of another material, such as for example a plastic, for treatments requiring a metal coating, such as in galvanizing.

Said drum (2) is supplied with the opposite polarity, i.e. positive polarity in the case of anodizing.

The electric current is delivered to the drum (2) by means of at least one contact pad (9) which is in contact with the drive ring (10) for driving the drum.

According to one feature of the invention, the vat comprises a set of contact pads (9), such as for example two times fifteen pads (9a, 9b, 9c, ..., 9n), as illustrated more particularly in FIG. 4.

According to the embodiment illustrated, the electrical contact with the drum takes place by sandwiching the drive ring (10) between two series of fifteen pads.

Said contact pads (9) are for example made of graphite, but they could be made of another material for other treatments.

It should be added that each of the pads (9) is mounted so as to move translationally toward the flanges (10a, 10b) of the ring and is pressed against the corresponding face of the corresponding sidewall by a resilient system, such as a spring.

Of course, the two lateral successions of pads are arranged in the form of a circular arc having for center the center of pivoting of the drum, as particularly apparent in FIGS. 1 and 4.

Thus, the graphite pads rub against the moving sidewalls, in order to transmit the current to the entire structure of the drum, and in particular to the slideways (3) by which the cassettes (4) are retained.

Each of the contact pads (9) is connected to a cable or a copper braid (12) connected to the power supply (13).

The graphite contacts rub on the flanges (10a, 10b) of the drive ring for driving the drum, transmitting in fact the current to the entire structure of the wheel, including the slideways (3) serving to support the cassettes.

Advantageously, the slideways (3) are equipped with flexible contact blades that are fixed to the slideways so as to transmit the electrical contact of the slideway to the corresponding cassette (4) and therefore to the parts that are fixed thereto, thus enabling the electrolysis to be carried out between the parts connected, in this application example, to the positive pole and the electrodes (8a, 8b).

It should be pointed out that according to the preferred embodiment the electrodes (8a, 8b) advantageously consist of aluminum plates connected to the negative pole.

It should be added that the aluminum plates constituting the electrodes are for example placed on either side of the drum close to the walls of the vat and lie parallel to the rotation axis of the drum.

The vat (1) thus equipped and filled with an electrolytic solution, such as sulfuric acid in the case of anodizing aluminum, enables aluminum parts fixed onto the cassettes to be anodized. Using this system, the electrolysis is carried out on parts fixed to cassettes that undergo a transverse and rotation movement on the wheel, thereby enabling continuous electrolysis to be carried out on parts moving in the treatment vat.

Of course, the invention is not limited to the embodiments described and illustrated by way of example, rather it also includes all technical equivalents and combinations thereof.

1. A treatment installation for treating a surface of metal parts, comprising an electrolysis vat containing a treatment liquid in which the parts to be treated are immersed, wherein the parts to be treated are fixed to a drum which is pivotably mounted, said vat comprising rotating means for rotating said drum so that said drum makes each part in the vat undergo a rotation movement, wherein vat comprises at least two electrodes, and wherein the drum is supplied with electric current of opposite polarity to that of the electrodes by means of a set of contact pads which are brought into contact with a drive ring driving the drum.

2. The treatment installation as claimed in claim 1, wherein the vat comprises a set of two times fifteen pads.

3. The treatment installation as claimed in claim 2, wherein the electrical contact with the drum takes place by sandwiching the drive ring between two series of fifteen pads.

4. The treatment installation as claimed in claim 3, wherein the contact pads mounted so as to move translationally toward flanges of the drive ring and are pressed against the corresponding face of said flanges by a resilient means.

5. The treatment installations as claimed in claim 4, wherein two lateral successions of pads are arranged in form of a circular arc having for center the center of pivoting of the drum, and wherein each pad is pressed against the corresponding flange by a spring.

6. The treatment installation as claimed in claim 5, wherein each of the contact pads is made of graphite and is connected to a connecting means selected from the group consisting of cables and copper braids, said connecting means being connected to a power supply.

7. The treatment installation as claimed in claim 1, wherein an external periphery of the drum comprises a succession of slideways intended for slidingly receiving the cassettes capable to support the parts to be treated.

8. The treatment installation as claimed in claim 7, wherein the slideways are equipped with flexible contact blades that are fixed to the slideways so as to transmit the electrical contact of the slideway to the corresponding cassette and therefore to the parts that are fixed thereto, thus enabling an electrolysis treatment to be carried out.

9. The treatment installation as claimed in claim 4, wherein the vats includes a motor for rotating the pivoting drum said motor cooperating by means of a toothed wheel with a succession of peg, which are mounted in mutually parallel arrangement, between the two flanges, said flanges forming of one of the sidewalls of the drum.

10. The treatment installation as claimed in claim 1, wherein the vat has two electrodes capable to be connected to either a negative or positive polarity, whereas the drum is supplied with the opposite polarity.

11. The treatment installation as claimed in claim 10, wherein the electrodes consist of aluminum plates.

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