Aug. 31, 1965 A. T. DE SAINT HARDOUIN ETAL 3,203,044

COATING APPARATUS

Filed July 10, 1962 2 Sheets-Sheet 1

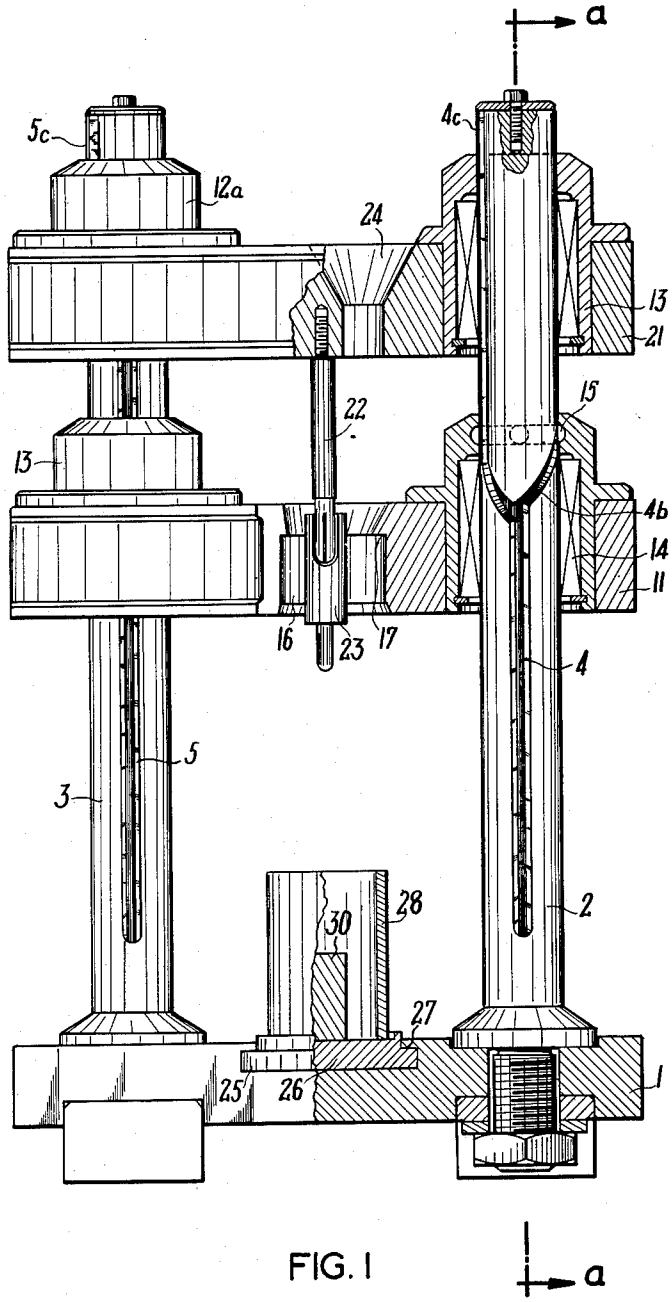

FIG. 1

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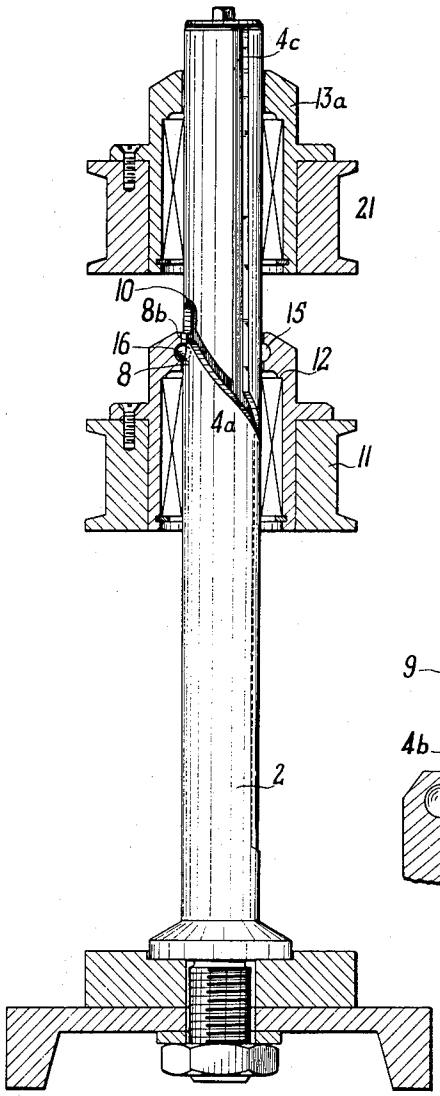
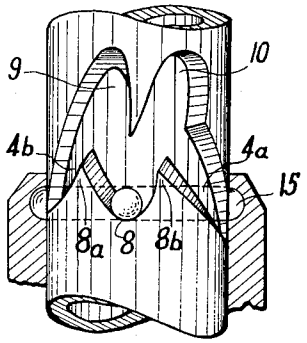


FIG.2

FIG.3



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3,203,044

COATING APPARATUS

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6 Claims. (Cl. 18—5)

It is frequently necessary, when a metal or other part or piece is coated with a suitable material, to protect one of its faces against any deposit of coating material and this is the case particularly with samples which must be subjected to a metallographic examination and more particularly with samples of irradiated fissile materials, which samples are generally coated with a resin.

These samples are then subjected to a mechanical polishing and to an electrolytic polishing.

Now, a good mechanical polishing is possible only if the face of the sample is absolutely devoid of coating material and this is extremely difficult to achieve with the usual devices. Moreover, when it is desired to effect a subsequent electrolytic polishing, the coating resin is usually employed for fixing an electrical current supply pin to one of the faces of the sample. The end of this pin is coated at the same time as the sample while it is held against the latter by a pneumatic device, for example. However, an application which is sufficiently strong and sufficiently constant to obtain a perfect contact between the pin and the sample is seldom achieved.

The present invention relates to a coating apparatus suitable more particularly for coating samples for the purpose especially of performing metallographic examinations, which is simple and easy to operate and which enables any passage of the coating material below the bottom face of the sample to be avoided in an absolutely reliable manner. It also enables an electrical pin to be fixed to the top face of the sample while maintaining a constant and very close contact between the two parts.

When the sample consists of an irradiated fissile material, the apparatus may easily be remote-controlled by means of a telemanipulator.

This apparatus may moreover be used for coating any part in which it is desired to protect a plane face against any deposit of coating material. It may also serve to fix any part whatsoever to the coated piece or part.

The coating apparatus forming the object of the invention is characterised essentially in that it comprises a support for the part to be coated, a ring for guiding the coating material around said part, a first counterweight for applying the ring against the support and a second counterweight for applying the part against the support through the medium of a member extending through the first counterweight, two parallel columns on the frame for the sliding of the two counterweights and means for guiding or immobilising independently each of the counterweights on the two columns.

According to another characteristic of the invention, each column comprises a longitudinal slot forming a recess for immobilising, in the high position, a ball guiding the movement of a counterweight and housed in said slot and in a sleeve of said counterweight.

According to a preferred form of embodiment, the member applying the part to be coated against the support may be an electrical pin to be fixed to a sample for the purpose of a subsequent electrolytical polishing operation.

Other features will moreover appear from the following description of a constructional form of a coating apparatus according to the invention, given by way of non-limitative example and shown in the drawing.

FIGURE 1 shows the coating apparatus according to the invention, seen half in second and half from the outside;

FIGURE 2 shows the same apparatus seen in section on the line *a*—*a* of FIGURE 1;

FIGURE 3 shows on a large scale the profile of the part of the slot forming an abutment for immobilising the counterweight in the high position.

As shown in the drawing, the coating apparatus illustrated comprises a base **1** to which two columns **2** and **3** are fixed by means of bolts and nuts. In each of these columns **2**, **3** there is formed a slot **4** and **5**, respectively, forming at a certain height a fork, the two arms **4***a* and **4***b* of which meet to form a seat or recess **8** between two inclined teeth **8***a* and **8***b* (FIGURE 3) in the lower portion and two recessses or seats **9** and **10** separated by a tooth in the upper portion. A vertical slot **4***c*, **5***c*, respectively, starts from one of the arms **4***a* of the fork and extends to the top of the column.

The forks are not at the same height on each of the columns, that of the column **3** being distinctly higher than that of the column **2**.

A first counterweight **11** slides on said columns **2** and **3** through the medium of longitudinal ball bearings **14** located in sleeves **12**–**13**.

One of these sleeves **12** has an internal annular groove **15** in which there is housed a ball **16** engaged in one of the slots **4**–**4***a*–**4***b*–**4***c* machined in the column **2** or, on the immobilisation of the counterweight **11** in the high position, in the seat or recess **8** between the teeth **8***a*, **8***b*.

A second counterwight **21** is mounted above the counterweight **11** on the columns **2** and **3**. It likewise comprises two sleeves **12***a* and **13***a* respectively identical to sleeves **12** and **13**, but the sleeve **13***a* slides on the column **2** above the sleeve **12**, while the sleeve **12***a* provided with the ball slides on the column **3** above the sleeve **13**.

In the centre of said counterweight **21** there is mounted a downwardly directed "rivet" holder **22** on which there is placed a "rivet" **23** serving as member bearing on the part to be coated. Between said "rivet" **23** and the sleeve **13***a* the counterweight **21** contains a bore **24** flared in its upper portion.

The counterweight **11** comprises in its central portion a recess **16** constituted by a bore, the upper frustoconical portion of which is flared upwardly and has a small base with a diameter smaller than that of the bore so as to form a shoulder **17**.

The base **1** comprises between the two columns **2** and **3** a recess **25** open at one of its ends into which there is slipped a cup **26** which is held by a peripheral shoulder **27**. In the centre of this cup there is placed the part to be coated **30**; a ring **28** of greater diameter and greater height than the part **30** is then placed around the latter in the cup.

In FIGURE 1, the part **30** is shown in the form of a cylindrical sample which is to be coated for the purpose of a subsequent metallographic examination, but it should be clearly understood that this part may be of any nature and that the apparatus can be applied to the coating of any part whatsoever having at least one plane base, more particularly in the case where it is desired to protect this plane face against any deposit of coating material.

In the inoperative state, the counterweights **11** and **21** are locked in their high position, the counterweight **21** at the top of the columns and the counterweight **11** slightly below. The balls **16** are in the recesses **8**.

When the part of sample **30** is in position in the cup, and also the ring **28**, the counterweight **11** is slightly raised. The ball **16**, guided by the tooth **8***a*, passes from

the recess 8 to the upper recess 9 and then slides into the slot 4*b* and then the slot 4, releasing the counterweight 11, which is carried along by its own weight and descends along the columns. In the course of this descent, the bore 16 passes around the ring 28 and the shoulder 17 abuts against the top edge of said ring. The counterweight is then resting fully on the ring, which it applies against the cup 26.

The counterweight 21 is lowered in the same manner, its ball 16 sliding in the slot 5 until the moment when the "rivet" 23 encounters the top face of the sample 30. The counterweight is then stopped, but it is supported entirely on the sample 30, which it applies against the cup 26.

A funnel (not shown) is then introduced into the orifice 24 and the coating material, a resin for example, is poured by means of said funnel through the orifice 16 into the space between the ring 28 and the sample 30 so as to coat the latter.

Once the operation has been completed and the coating material being solidified, the counterweights 11 and 21 are raised again. The balls 16 run through the slots 4 and 5, respectively and then the slots 4*a* and enter the recesses 10 before sliding into the recesses 8 to lock the counterweights in their top positions. The coated part can then be removed.

When it is desired to subject the sample subsequently to an electrolytical polishing operation, there is used as the "rivet" 23 an electrical pin, male at one end and female at the other and the male portion of which bears on the sample 30. The coating material is preferably a suitable resin which welds the pin to the sample when the counterweight 21 is raised. This pin 23 leaves the holder 22 and remains fixed to the sample, the holding of which it can facilitate while permitting the flow of the electric current. It would moreover be possible to fix in the same manner to the part to be coated any other member or part of the same kind.

Owing to the clamping by gravity to the ring and the part, of counterweights the dimensions of which are proportionally very large, perfect adherence of the bottom surface of the ring and of the part to the cup is obtained and this prevents any flow of the coating material on to the bottom faces of the two parts.

Likewise, the contact between the top face of the sample and the pin is constant and very close, since it is the pin itself which serves as intermediary between the counterweight and the sample.

Operation being very simple, friction being slight and the counterweights being adapted to be operated separately, this apparatus can easily be remote-controlled and this makes it particularly suitable for coating samples of irradiated fissile materials.

Various modifications may moreover be made in the form of embodiment which has just been described without departing from the scope of the invention.

We claim:

1. Coating apparatus for holding a part to be coated, comprising: a base having a flat, horizontally disposed upper surface portion providing a support for the part to be coated; a ring for enclosing said part having the lower edge thereof seated in sealing engagement on said support and extending upwardly to a height above said support which is greater than the height of the part to be enclosed and coated; a first counterweight mounted on said base for vertical movement above said ring, said first counterweight being movable between an upper position spaced above said ring and a lower position resting on the upper edge of said ring for applying the ring against the support during a coating operation; said first counterweight having a vertically extending opening formed therethrough positioned above said ring for conducting coating material into said ring and around the part to be coated; a second counterweight mounted on said base for vertical movement and positioned above said first counterweight and said ring; a member rigid with said second counterweight and depending therefrom in vertical alignment with said opening and with said part to be coated, said member being of such a size as to pass freely through said opening, and to permit coating material to pass freely between the wall of said opening and said member during a coating operation, said second counterweight being movable between an upper position spaced above said first counterweight when it is in its upper position and a lower position spaced above said first counterweight when it is in its lower position and with said member extending through said opening and resting on the part to be coated for applying the part against the support during a coating operation, said second counterweight being formed with passage means for guiding coating material therethrough and to said opening in said first counterweight.

2. Apparatus according to claim 1 wherein vertical column means rigid with said base extend vertically upwardly therefrom, said first and said second counterweights being slidably mounted on said column means for movement between said upper and said lower positions and releasable means for immobilizing said first and said second counterweights in said upper positions.

3. Coating apparatus according to claim 1, in which an electrical pin to be attached to the part is releasably mounted on the lower end of said member and engages said part when said second counterweight is in said lower position, the weight of said counterweight on said part being transmitted through said pin, said pin being fixed to said part by the coating material as a result of a coating operation and being released from said member at the completion of the coating operation and subsequent movement of said second counterweight to said upper position.

4. Coating apparatus for holding a part to be coated, comprising: a base having a flat, horizontally disposed, upper surface portion providing a support for the part to be coated; a ring for enclosing said part having the lower edge thereof seated in sealing engagement on said support and extending upwardly to a height above said support which is greater than the height of the part to be enclosed and coated; a pair of parallel columns rigid with said base and extending vertically upwardly therefrom; a first counterweight slidably mounted on said columns and positioned above said ring for vertical movement, said first counterweight being movable on said columns between an upper position spaced above said ring and a lower position resting on the upper edge of said ring for applying the ring against the support during a coating operation; said first counterweight having a vertically extending opening formed therethrough and positioned above said ring for conducting coating material into said ring and around the part to be coated, a second counterweight slidably mounted on said column for vertical movement and positioned above said first counterweight and said ring, a member rigid with said second counterweight and depending therefrom in vertical alignment with said opening and with said part to be coated, said member being of such a size as to pass freely through said opening, and to permit coating material to pass freely between the wall of said opening and said member during a coating operation, said second counterweight being movable between an upper position spaced above said first counterweight when it is in its upper position and a lower position spaced above said first counterweight when said first counterweight is in its lower position and with said member extending through said opening and resting on the part to be coated for applying the part against the support during a coating operation; and releasable means for immobilizing said first and said second counterweights in said upper positions; said second counterweight being formed with passage means for guiding coating material therethrough and to said opening in said first counterweight.

5. Coating apparatus according to claim 4 in which each of said counterweights include sleeves for guiding said counterweights on said columns during vertical movement thereof, each of said sleeves housing vertically aligned ball bearings disposed between the sleeve and the corresponding column.

6. Coating apparatus according to claim 4 in which each of said columns is formed on the outer surface thereof with a vertically extending groove, and an oblique groove extending at an angle from the corresponding vertical groove, said oblique grooves including a recess for receiving therein a ball; a ball carried by and movable vertically with each of said counterweights seated in said grooves, said oblique grooves and recesses being located

at the upper position of the respective counterweight, said balls being movable between the corresponding vertical groove and the respective recess upon imparting vertical movement to said counterweights, said counterweights being releasably maintained in the upper position by the respective ball when it is seated in the corresponding recess.

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