The invention relates to a suction device for ceramic presses in which it is necessary to remove unwanted material from the perimeter of the hydraulic punch of the press following a pressing operation. The inventive device consists of an elastically-deformable plastic bell element which is connected to intake manifolds that are provided for suction purposes, thereby preventing the use of more expensive punches comprising suction conduits. The aforementioned bell element can also be equipped with perforations which prevent the vacuum effect form occurring as the bell is being removed.
Description

OBJECT OF THE INVENTION

[0001] The present invention refers to a suction device for ceramic presses in which after the pressing operation it is necessary to remove the trimmings all along the outside edge of the hydraulic or conventional press punch.

[0002] This device is characterised by the use of a plastic or rubber hood with elastic deformation capacity coupled to inlet manifolds responsible for suction.

[0003] This hood is provided with perforations that prevent the suction cup effect during its removal.

BACKGROUND OF THE INVENTION

[0004] The tile and ceramic piece manufacturing process involves a pressing stage in which the clay is shaped mechanically, normally by a hydraulic punch press.

[0005] In the pressing operation clay trimmings are generated that it is necessary to remove either by hand or with a compressed air suction or ejection system.

[0006] These external suction systems may be of two types: a first type consisting of an aspirator external to the press and which is usually handled by the operator to remove the surplus material; or else an internal suction system.

[0007] Internal suction systems require channels to be incorporated into the moulds, which have to be machined, thus raising costs very substantially.

[0008] The European Patent with publication number EP1136212 describes an improved device for shaping ceramic products, including blocks, roof tiles and the like by means of powder pressing.

[0009] This device comprises a largely flat lower support element, on which the ceramic powder is placed. Above is the press element and this is what is provided with a perimeter shoulder plus perforations communicating with ducts internal to the upper mould.

[0010] The upper mould is the one which collects the surplus powder by means of larger-sized slots than the suction ducts and conveys it to the main manifold.

[0011] In the invention described below no ducts have to be incorporated into the mould, thereby saving an increase in its manufacturing cost which is very high.

DESCRIPTION OF THE INVENTION

[0012] The present invention refers to a suction device for ceramic presses which, as mentioned in the previous section given over to the background of the invention, dispenses with solutions based on the inclusions of internal ducts in the mould or punches.

[0013] The present invention consists mainly of a hood which is installed on the upper punch.

[0014] The lower punch is fitted at the sides with cutters with the function of configuring the sides of the ceramic piece and they are located in a frame which presents a flat horizontal surface at the top.

[0015] The area internal to the cutters comprises a space in which the clay is deposited for pressing and shaping.

[0016] Above lies the vertically moving and sliding upper punch, which descends to apply the required pressure onto the clay.

[0017] It is after the pressure stage when excess material appears around the punch that has just descended and which has to be removed.

[0018] This is the task performed by the device of the present invention.

[0019] This device consists of a hood formed by a perimeter skirt arranged around the upper punch.

[0020] Superiorly it has a frame with an inverted "L" structure defining a lower channel intended for housing a shoulder on the upper punch.

[0021] The main walls of the hood are the ones that enclose the suction space, being oblique in order to assist their bending under pressure of the upper punch against the lower horizontal surface.

[0022] The material used in the hood is flexible, preferably plastic, and enables it to be deformed without the lower edge ceasing to establish the required seal with the lower edge against which it is applied by deformation due to unwanted buckling.

[0023] At the top these same sides of the hood are perpendicular to the surface against which the hood is applied.

[0024] It is in these sections where there are openings communicating the interior of the hood with some manifolds connected to suction tubes allowing for the deformation of the sloping walls that there are below.

[0025] Once the enclosure has been aspirated, the punch rises and is withdrawn.

[0026] The lower edges of the hood have a section finished in a wedge that assists tight sealing under pressure.

[0027] This same seal could create the suction cap effect during withdrawal of the punch and the suction hood.

[0028] In order to prevent this suction cap effect, as an option the window also has perforations in the side wall that permit the flow of air.

DESCRIPTION OF THE DRAWINGS

[0029] The present descriptive report is supplemented with a set of drawings that are illustrative of the preferred embodiment but never restrictive of the invention.

[0030] Figure 1 shows the elevational and profile view of the plastic hood with the suction manifolds, including the configurations deformed by the action of pressure against the lower frame.

[0031] Figure 2 is a section of the plastic hood in its deformed configuration in which we observe the sharp-
ened sealing edge as well as the retaining frame.

Figures 3, 4, 5 and 6 comprise a lowering sequence of the upper punch with the suction hood, relating the suction device to the rest of the components of the press; and, as in the pressure stage, deformation appears mainly in the side walls of the hood.

PREFERRED EMBODIMENT OF THE INVENTION

The present invention consists of a suction device for ceramic presses.

Figure 1 shows the plan, elevation and profile view of a preferred embodiment of the suction device consisting mainly of a hood (1) plus suction manifolds (1.3).

The configuration of the hood (1) consists of a skirt (1.1) surrounding the whole outside edge of the upper punch (6) forming a suction space in such a way that it is not necessary to modify the upper punch (6), for instance by machining suction channels.

In this preferred embodiment the upper punch (6) is square, so the skirt (1.1) is too; in any other embodiment of the invention the form of the hood should adapt to the perimeter configuration of the upper punch.

In figure (2), which shows the section of the suction device through a central plane, we observe an inverted "L"-section inner frame (1.7) for securing to the upper punch (6).

The sides of the skirt (1.1), as shown in figure 1, are oblique and flat when no pressure is exerted.

Inferiorly, its cross section decreases in a tapered configuration so that the edge (1.2) establishes a better seal when pressed against the upper horizontal surface of the lower frame (2).

As its edge (1.2) is finer, it permits greater deformations, which adapt to the possible irregularities of the lower frame (2).

In face of the pressure of the upper punch (6), the oblique side (1.1) of the skirt is deformed defining a curved section so that the inner frame (1.7) continues protruding inside the frame that defines the lower sharp edge (1.2).

This fact is what justifies obtaining a stable deformed configuration with no buckling.

Figure 1 shows two elevational and two profile views, the closest to the plan view is the device when not deformed and the furthest removed from the plan view is the device deformed by the action of the force of the upper punch (6) during pressing.

At their top end where they are vertical, the sides of the device are provided with slots (1.6) communicating the inner chamber defined by the skirt (1.1) and the upper punch (6) with the suction ducts that are connected to mouths (1.4) where the suction manifolds (1.3) terminate.

Figures 3, 4, 5 and 6 show different stages of pressing, highlighting how and when the suction device acts.

These figures show the lower punch (4) on which the clay (3) is placed, the frame (2) on which the side cutters are housed; and, above all these, the punch (6), which descends to exert the pressure required for shaping the ceramic piece.

The upper punch (6) is in the suction device (1) surrounded by the skirt (1.1) with the sharp edge (1.2) facing downwards.

The suction inlets (1.4) are in the sides and will be coupled to suction pipes which will perform the suction when ordered by the control means synchronising the movements of all the press components.

During descent the skirt (1.1) presents its flat oblique side faces, as it is not deformed.

Figure 4 shows the moment when the edge (1.2) of the skirt (1.1) comes into contact with the lower frame (2) but not the lower punch (6).

As the downward stroke continues, the upper punch (6) exerts pressure against the mass (3) to be shaped, and this descent is reflected in a deformation of the oblique sides (1.1) of the suction device.

In figure 6 the lines of suction flow current that removes the surplus clay are shown with arrows.

The subsequent ascent of the upper punch is assisted by the presence of side perforations (1.5), shown only in figure 2, in the skirt (1.1) to prevent the suction cap effect.

The essential nature of this invention is not altered by variations in materials, shape, size and arrangement of the component parts, described in a non-restrictive way but sufficing for an expert to be able to proceed to its reproduction.

Claims

1. Suction device for ceramic presses from amongst the means for removing trimmings from ceramic presses by means of suction, characterised in that it is composed of an elastic material hood (1) with a perimeter skirt (1.1) defining a cleaning space around the upper punch (6) and means of connection (1.3) to the suction pipes; and which comprises:

   • an internal fastening frame (1.7) with an inverted "L"-shaped section structure for attachment to the upper punch (6).

   • a side skirt (1.1) with an oblique intermediate section to permit deformation under the pressure stress of the upper punch (6).

   • a lower edge (1.2) of the skirt (1.1), tapering or pointed for better sealing against the lower frame (2).

   • a side slot (1.6) at the top end of the skirt (1.1) communicating with suction manifolds (1.3) that lead to the connections (1.4) with the suction pipes.
2. Suction device for ceramic presses according to claim 1 characterised in that the skirt (1.1) has side perforations (1.5) to prevent the suction cap effect.
### INTERNATIONAL SEARCH REPORT

**International application No.**

PCT/ES02/00544

#### A. CLASSIFICATION OF SUBJECT MATTER

**IPC 7** B30B15/00, B28B17/04

According to International Patent Classification (IPC) or to both national classification and IPC

#### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**IPC 7** B30B+, B28B+

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**CIBEPAT, EPODOC, WPI, PAJ**

#### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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- See patent family annex.

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**Date of the actual completion of the international search**

29 January 2003  (29. 01. 2003)

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31 January 2003  (31. 01. 2003)

**Name and mailing address of the ISA/Authorized officer**

S.P.T.O.

**Facsimile No.**

Authorized officer

**Telephone No.**

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