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(54) **A method and device for discharging brick mouldings from moulding trays.**

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Description

The invention relates to a method for discharging brick mouldings from moulding trays, wherein moulding trays filled with mouldings are tilted and the mouldings are released from the tilted moulding trays and are received on a carrying pallet.

Such a method is part of a well-known method (see, for example, EP-A-0 365 099) for working a supply of clay to mouldings adapted for firing of e.g. bricks having the so-called hand mould structure. With this method use is made of equipment, provided with a press of the type which forms the clay into lumps and deposits these lumps into moulding trays on an endless conveying means mounted for intermittent passing under the press, said conveying means passing the moulding trays across a device for trimming the filled moulding trays, there being further provided a station wherein the filled moulding trays are tilted, a station wherein the mouldings are discharged from the moulding trays onto carrying pallets supplied to said station, a station for washing, drying and sanding of the empty moulding trays and a station for tilting the moulding trays back into the filling position.

With the method according to the invention more specifically that part of the whole process is involved, which is carried out in the station where the mouldings are discharged from the inverted moulding trays onto carrying pallets supplied to this station. With the method used so far the release of the mouldings from the inverted moulding trays is taking place by vibration and more particularly by causing a vibration plate which is put into vibration by means of a vibration motor to act upon the upwardly facing bottom of the inverted moulding trays. A disadvantage of this discharging method, as encountered in practice is that the time passing between the start of the vibration and the moment of release of the moulding may vary to a rather large extent in dependence of the various type of clay to be worked, whereas the extent of sanding and the degree of humidity of the sand used thereby may be of influence as well. Frequently it appears to be impossible to effect this way of releasing in the available period of time (e.g. in the order of one second) within a complete cycle. By supplying more vibration power more certainty would be obtained with respect to the release, in time, of the mouldings. The generation of more powerful vibrations, however, also results in a substantial increase of the mechanical load of the entire equipment. Moreover this would lead to unacceptable high noise level within the moulding device.

It is an objective of the invention to contribute to a more effective way of discharging of brick mouldings from moulding trays, thereby avoiding the objections inherent to the vibration method above referred to.

In accordance with the invention this objective is

achieved in that the release of the moulding is taking place by admitting -via opening in the bottom of the moulding trays and during a short period of time -air under increased pressure into the moulding trays containing the mouldings.

It has been found that in this way an immediate and silent release of the mouldings can be effected by means of air of a relatively low pressure, without any affection of the moulding by the air under pressure. Differences as indicated hereinabove with respect to various kinds of clay are playing a negligible role.

According to the invention use may be made of the circumstance, that moulding trays of the type under consideration often have slits in the moulding tray bottom, through which air may escape to allow the deposited clay lumps to sag out.

The use of air under pressure as release means is commonly known in other technical fields. These well-known applications, however, in general relate to ejecting more or less inflexible, finished articles or articles of a relatively easily releasing shape.

The invention also relates to an auxiliary device for discharging brick mouldings from the moulding trays in brick moulding equipment. The device according to the invention is characterized by a cap-shaped mouth piece adapted to be placed with its mouth into sealing contact with the bottom of a moulding tray and designed to be connected to a source of increased air pressure.

The invention will be hereinafter further explained by way of example with reference to the drawing.

Fig. 1 is a perspective view of equipment, in which single moulding trays (i. e. moulding trays which are capable of containing one brick moulding) are successively displaced across a number of working stations;

fig. 2 shows a cross-section through a detail relating to the auxiliary device according to the invention;

fig. 3 is a cross-sectional view of the bottom of a moulding tray in a specific embodiment, adapted for use with the method according to the invention;

fig. 4 shows a cross-section of a moulding tray as represented in fig. 3 in the position for release and

fig. 5 shows a cross-section of a modification of the moulding tray embodiment shown in fig. 3 and 4.

The equipment shown in fig. 1 comprises a turntable 1, having a mounting ring supported by legs 2 and covered on the upper side by a removable cover 3, a supporting ring 5 for the moulding tray supports 6 being suspended by said mounting ring 4 in a rotary manner (not further shown). The supporting ring 5 is toothed at its inner circumference (not shown), the teeth of which mate with a drive gear, the rotary

movement of which is taken off from a central drive motor.

The moulding tray supports 7 are rotatably mounted to the supporting ring 5 about axes 8 and provided with a pair of rollers 9 at the outer circumference, said rollers running over a guide rail 10 extending along the outer circumference of the turntable so as to normally hold the moulding tray supports 7 in their horizontal position. The guide rail 10 is locally interrupted in connection with a tilting movement of the moulding tray supports which will be hereinafter further described.

A moulding tray 11 is removably fixed in each moulding tray support 7. In the example shown moulding trays are used, which are provided with a single moulding cavity for one moulding. The turntable may be moved stepwise in the direction of arrow I and comprises e. g. twelve fixed circumferential positions, in which the turntable is kept stationary during e. g. one second after each rotational step, while the stepwise displacement is taking place in e. g. two seconds.

In the drawing each of the twelve moulding trays and moulding tray supports respectively is taking one of the said fixed circumferential positions.

Of particular importance for the present invention is the discharge position indicated at 15, in which the respective moulding tray 11 is positioned with its filling opening facing downwards in order to drop the moulding onto the pallet 12 supplied underneath.

13 designates a sill extending diametrically under the turntable 1 and adapted for supplying empty pallets 12 across the same from one side (i. e. from the right as seen in fig. 1). The position indicated at 14 and preceding the discharge position 15 is also of importance.

In position 14 the respective moulding tray support has to be tilted in a quick manner, so that the respective moulding tray will enter into the discharge station 15 in a substantially horizontal (but inverted) position. For a detailed description of the respective tilting mechanism reference is made to the European Patent Application EP-A-0 408 150.

In the discharge station 15 there is provided a cap-shaped mouth piece 16 which in the example shown is supported by supporting arms 17 that are pivotally fastened to the mounting rail 4, the mouth piece chamber 18 (vide fig. 2) of said mouth piece being provided with means for connection to a source of increased pressure not further shown in the drawing. Normally, i. e. during the displacement phase of the moulding tray support, the downwardly facing mouth opening 19 of the mouth piece 16 is positioned at a certain distance straight over the discharge position. Around the edge of the mouth opening 19 a strip 20 of a compressible sealing material is provided.

As soon as an inverted, loaded moulding tray 11 has come to a stillstand within the discharge station

15, the supporting arms 17 will be actuated in a manner not further shown in the drawing so as to cause the mouth piece 16 to engage the bottom of the respective moulding tray. The edge of the mouth opening 19 fits on a narrow marginal portion of the upwardly facing moulding tray bottom 21, in which the air passage slots 22 are provided. The sealing material 20 provides for an effective sealing between the moulding tray bottom 21 and the edge of the mouth opening 19 of the mouth piece 16. A short release of the air under pressure from the pressurized air source will suffice to cause the moulding to become released from the respective moulding cavity under the pressure of the air entering into the moulding cavity through the slot 22. In practice a pressure of no more than 2 bar has been found sufficient to secure a release within the relative short period of time which is available for this purpose. It will be clear, that in a similar manner a plurality of mouldings may be simultaneously released from moulding trays containing a plurality of moulding cavities, by means of a correspondingly extended mouth piece which may be divided into compartments corresponding with said moulding cavities, if desired.

The invention is also applicable with brick moulding equipment of a different type, with which e. g. the moulding trays are transported in a vertically oriented path and in which the moulding trays are tilted in a different way.

The method according to the invention may also be successfully applied for discharging from a moulding tray of non-sanded mouldings which are destined for the manufacture of bricks having a so-called "Wasserstrich structure".

Fig. 3 shows a special type of moulding tray 11a as used for making mouldings for bricks, which are provided with a so-called "frog" in one of the broad faces. Usually the purpose of such a "frog" is to keep the so-called "drying volume" of the brick - although thicker, wide or longer than normal - equal to that of a brick of the usual size. Said "frog" is obtained by providing on the bottom 21a of the moulding tray 11a an insert or rise 24. A so formed moulding tray 11a, 21a is - after a slight adaptation - particularly suitable for use when applying the method of discharging according to the invention. The required adaptation is obtained by fastening the insert or rise 24 onto the inner of the moulding tray bottom 21a with a limited movability in vertical direction rather than being fastened fixedly as known so far. In addition to that a (central) opening 25 is provided in the area of the bottom 21a which is positioned opposite the insert or rise 24 and which may fulfil the function of the openings 22 in the embodiment of fig. 2.

In the normal position, with the filling opening of the mould facing upwardly (fig. 3), the insert 24 engages the moulding tray bottom 21a into direct contact so that the required clearance, in the order of 1

mm, is located (practically) entirely on the side of the heads 26 of the fastening screws 27. In the position the moulding tray 11a, 21a can be filled in the normal way. When inverting the moulding tray 11a, 21a (which is covered by a pallet upon filling) the insert 24 will become released from the moulding tray bottom (21a), so that air under increased pressure which is supplied through a mouth piece 28 placed around the opening 25 on the outer side of the bottom 21a may rapidly spread across a substantial area of the upper face of the moulding, thereby creating a substantially uniform ejecting pressure, which secures an effective release of the moulding from the moulding tray 11a, 21a.

The advantage of the embodiment of fig. 3 in comparison with that of fig. 2 is to be seen in the substantially smaller mouth piece, which may be pressed onto the moulding tray bottom with substantially less effort.

Fig. 5 shows still another practical embodiment of a moulding tray which is adapted for use when applying the manner of discharging according to the invention. In this case a substantially wide opening 25' is provided on a central location of the generally flat moulding tray bottom 21b, said opening being, on the inner side of the bottom 21b, covered by a plate element 29, which is permeable to air but impervious to clay, said plate element being preferably formed of wire gauze, the mesh size of which is in the order of 1 mm. The plate element 29 has its circumferential edge portion sunk into the inner bottom surface and may be fixed as by an adhesive. The plate element may be held in a separate annular frame, if desired, so that it can be interchanged in an easy way. It has been found, that there is an effective release of the clay from the wire gauze when inverting the mould and that also in this embodiment a uniform ejection pressure is built up over the moulding to be released, when a mouth piece 28 connected to a source of increased air pressure (until about 2 bar) is placed around the opening 25'.

Claims

1. A method of producing mouldings adapted to be fired to bricks, comprising the steps of:
 - providing substantially rectangularly shaped moulding trays (11), having substantially vertical side walls, a bottom (21) with a venting opening (22) therein and an open top:
 - depositing lumps of clay into the cavities of said trays, into direct contact with the major part of the bottom surface;
 - turning the trays (11) upside down to release the mouldings therefrom onto a carrying pallet (12) therebelow,
 - characterized in that the release of a

moulding from a moulding tray (11) is effected by placing a mouth piece (16) into sealing contact with a portion of the outer surface of the inverted moulding tray surrounding said venting opening (22), after which air under increased pressure is supplied via said mouth piece into said venting opening during a short period of time.

2. A moulding tray (11) for use with the method of claim 1, comprising a bottom (21), side walls extending substantially perpendicularly from said bottom and delimiting a substantially rectangular moulding cavity, the bottom of the tray being provided with at least one venting opening (25,25') through which the moulding cavity is in communication with the atmosphere, characterized in that the venting opening is covered on the inner side of the bottom by an element (24,29) which is permeable to air but impervious to clay.
3. A moulding tray according to claim 2, characterized in that the venting opening (25) is covered by an insert (24) which is fixed to the bottom surface with a vertical play.
4. A moulding tray according to claim 2, characterized in that the venting opening (25') is covered by a perforated plate element (29).
5. A moulding tray according to claim 4, characterized in that the plate element (29) is formed of wire gauze having a mesh size in the order of 1 mm.

Patentansprüche

1. Verfahren zur Herstellung von zu Formsteinen zu brennenden Formlingen, die folgenden Schritte umfassend:
 - das Bereitstellen von etwa rechteckigen Formkästen (11) mit etwa senkrechten Seitenwänden, einem Boden (21) versehen mit einer Entlüftungsöffnung (22) und einer offenen Oberseite;
 - die Deponierung von Tonklumpen in die Formhohlräume der Formkästen, und zwar in unmittelbarem Kontakt mit dem Hauptteil der Bodenoberfläche;
 - das Umkehren der Formkästen (11) zur Entladung der Formlinge und zum Übertragen derselben auf eine sich darunter befindliche Tragpalette (12),
 - dadurch gekennzeichnet, dass die Entladung einer Formling aus einem Formkasten (11) dadurch bewirkt wird, dass das Mundstück (16) abdichtend gegen einen die Entlüftungsöffnung (22) umgebenden Teil der Aussenoberfläche des

umgekehrten Formkastens zum Anliegen gebracht wird, worauf während einer kurzen Zeit Luft unter erhöhtem Druck über das Mundstück durch die Entlüftungsöffnung eingetragen wird.

2. Formkasten (11) zur Anwendung bei einem Verfahren nach Anspruch 1, mit einem Boden (21) und von letzterem etwa senkrecht aufstehenden, einen etwa rechteckigen Formhohlraum begrenzenden Seitenwänden, wobei der Boden des Formkastens mit mindestens einer Entlüftungsöffnung (25, 25') versehen ist, durch welche der Formhohlraum mit der Atmosphäre in Verbindung steht, dadurch gekennzeichnet, dass die Entlüftungsöffnung an der Innenseite des Bodens von einem luftdurchlässigen, sondern Tonundurchlässigen Element (24, 29) abgedeckt ist. 10
3. Formkasten nach Anspruch 2, dadurch gekennzeichnet, dass die Entlüftungsöffnung (25) von einem mit vertikalem Spiel auf der Bodenoberfläche befestigten Einsatz (24) abgedeckt ist. 15
4. Formkasten nach Anspruch 2, dadurch gekennzeichnet, dass die Entlüftungsöffnung (25) von einem perforierten Plattenelement (29) abgedeckt ist. 20
5. Formkasten nach Anspruch 4, dadurch gekennzeichnet, dass das Plattenelement (29) von einem Drahtgeflecht mit einer Maschenweite in der Größenordnung von 1 mm gebildet wird. 25

Revendications

1. Un procédé de fabrication de pièces moulées conçues pour être cuites de façon à former des briques, comprenant les étapes suivantes: 35
 - on fournit des moules (11) de forme pratiquement rectangulaire, ayant des parois latérales pratiquement verticales, un fond (21) dans lequel est formée une ouverture d'évent (22), et un sommet ouvert; 40
 - on dépose des blocs d'argile dans les cavités de ces moules, en contact direct avec la majeure partie de la surface du fond; 45
 - on retourne les moules (11) pour en dégager les pièces moulées et pour les faire tomber sur une palette de transport (12) se trouvant au-dessous, 50
 - caractérisé en ce que l'opération consistant à dégager une pièce moulée se trouvant dans un moule (11) est effectuée en plaçant un embout (16) en contact hermétique avec une partie de la surface extérieure du moule retourné, entourant l'ouverture d'évent (22), après quoi on fournit de l'air sous pression accrue à l'ouverture d'évent, par l'intermédiaire de l'embout, pen-

dant un court intervalle de temps.

2. Un moule (11) prévu pour l'utilisation avec le procédé de la revendication 1, comprenant un fond (21), des parois latérales s'étendant pratiquement perpendiculairement à partir du fond, et délimitant une cavité de moulage pratiquement rectangulaire, le fond du moule comportant au moins une ouverture d'évent (25, 25') à travers laquelle la cavité de moulage est en communication avec l'atmosphère, caractérisé en ce que l'ouverture d'évent est recouverte du côté intérieur du fond par un élément (24, 29) qui est perméable à l'air mais imperméable à l'argile.
3. Un moule selon la revendication 2, caractérisé en ce que l'ouverture d'évent (25) est recouverte par un insert (24) qui est fixé à la surface du fond avec un jeu vertical.
4. Un moule selon la revendication 2, caractérisé en ce que l'ouverture d'évent (25') est recouverte par une plaquette perforée (29).
5. Un moule selon la revendication 4, caractérisé en ce que la plaquette (29) est formée par un treillis métallique ayant une dimension de maille de l'ordre de 1 mm.



