

The subject of the present invention is a method of making articles from a mouldable material in the form of a wet paste and a pressing mould for carrying out this method. This procedure is intended in particular for making products from smooth or rough clay, such as roof tiles, tile elements or decoration elements.

In practice, the clay products are made by moulding a clay slab in the form of a wet paste, this moulding taking place within a wet mould, by pressure exerted between the two parts of the mould, which is an open mould.

An important problem to be solved in the case of the moulding of such products, is the tendency of the clay to adhere to the two parts of the mould, at the end of the moulding process. This adherence limits the manufacturing flow, and shows as manufacturing defects in that where the clay particles remain stuck to the mould, these become gaps in the moulded element.

To remedy these disadvantages, the following solutions have already been envisaged.

According to a first possibility, each clay slab is coated with a stripping oil before being pressed between the two portions of a metal mould.

The disadvantage lies in the fact that it is advisable to coat each slab with oil, that the thin film of oil slows down drying and that the

clay, due to the fact that the coating "creeps" between the moulds, the thin skin of oil also risks "creeping", which then results in sticking.

Another solution consists in forming the moulds from plaster. The plaster being saturated with water, there is produced, upon pressing, a thin skin of water on the surface of the mould, which aids the stripping. However, such moulds have a very short life span, due to the fragile nature of plaster, and to the abrasive character of clay.

It is also known to use a metal mould and to supply a powerful electric current (100 volts - 100 amps) to the two halves of the mould at the moment of pressing. This leads to electrolysis between the clay and the moulds, aiding stripping. However, it is an expensive system and results in significant and rapid corrosion of the moulds.

Finally, it is known to equip metal or resin moulds with a very fine and very resilient membrane of synthetic material, having a very small power of adhesion to clay. The defect of these membranes is that they are fragile and that they often tear, requiring periodic replacement, which necessitates frequent stopping of the installation, impairing production capacity. Moreover, these membranes tend to efface the sharp angles of the mould, only permitting the production of articles of which the shapes are relatively rounded.

Document GB-A-2.133.338 describes a mould within the thickness of which channels are formed to ensure the placing in depression of the moulding cavity before and during the injection of material into the mould.

The object of the invention is to provide a method of moulding and a mould which is made from a highly abrasion resistant material having a long lifespan, which permits the production of articles over very long periods without interruption and within which clay does not stick.

To this end, the method to which it relates, for making articles from a mouldable material in the form of a wet paste within a mould, of which each mould portion has a base of a known type, for example of aluminium, provided with a lining having an impression of complementary shape to that of the article to be moulded, this lining being made of a porous abrasion-resistant material, is characterised in that it consists in supplying steam under pressure, during the pressing phase, to a network of capillary holes opening into the porous lining.

At the moment of pressing, steam under pressure is injected through the porous material. The result is the formation of a thin skin of condensed water upon contact with the cold clay, which facilitates stripping of the mould. The lining, being made from a hard abrasion resistant material, permits the production of articles having sharp angles and has a long life.

In accordance with another characteristic of the invention, the pressure of the steam brought into contact with the internal faces of the two mould portions is at least equal to the pressure exerted by these latter on the material to be moulded. It should be noted that in this case, work is carried out with an open mould, the pressure exerted by the two mould portions on the clay slab being a function of the hardness of this latter. The harder the slab, the higher the pressure used for the production of the moulded article. Advantageously, the internal faces of

the two mould portions are supplied with saturated steam at 150° - 180°C under a pressure of the order of 20 bars (1bar = 10^5 Pa).

Advantageously, the base of each mould portion is lined with a layer of epoxy resin having an impression of complementary shape to that of the article to be moulded, into which the network of capillary holes of the base is extended, this layer of resin itself being coated, on its moulding face, with the lining layer of porous abrasion-resistant material.

This solution permits the provision of a supporting layer of which the shape can be easily adapted to the shape of the articles to be obtained, whilst limiting the thickness of the lining layer to a low value between 0.5 and 1.5 mm. for example.

The lining layer of porous and abrasion resistant material is either made from a ceramic, for example having a base of alumina sintered to zirconium-chromium, or from synthetic resin.

In one embodiment of this mould, the base of each mould portion has a network of channels parallel to the surface of the mould portion into which opens the network of capillary holes, the channels being supplied from a distribution conduit, with flow balancing in each channel by means of an adjustment screw.

In order to avoid condensation in the mould and to help vaporisation, the base of each mould portion is equipped with heating resistors.

In accordance with another characteristic of the invention, the base of each mould portion is equipped with a network of channels and capillary passages opening into the lining layer, this network being supplied by a source of compressed air, the supply being effected during stripping of the mould.

In any case, the invention will be well understood with the help of the following description, with reference to the accompanying schematic drawings, showing, by way of non-limitative example, one embodiment of this mould:

Figure 1 is a view in longitudinal section of a mould portion, the second mould portion being shown in broken lines;

Figure 2 is a view in section of the mould portion of Figure 1, along the line II-II of Figure 1.

Figure 1 shows, seen in section, a mould portion designated by the general reference 2, having a base 3 of known type made, for example, from aluminium. On this base 3 is fixed an element 4 of epoxy resin, of which one face corresponds to the external profile of an element 5 to be moulded, for example from a maleable and mouldable material, such as clay. The epoxy resin is coated with a layer 6 made from a very hard abrasion-resistant material having a good porosity, such as an alumina sintered to chromium-zirconium.

As shown in the drawing, there is formed in the base 3 a conduit 7 connected to a source of steam, this conduit 7 supplying a plurality of channels 8, parallel to the moulding face, balancing of the

steam at the level of the different channels 8 being effected by means of an adjustment screw 9. An outlet conduit 10 is disposed at the other end of the channels 8. Into the channels 8 open capillary passages 12 formed, on the one hand in the base 3 and, on the other hand in the layer of epoxy resin 4 and extending as far as the ceramic layer 6. These capillary passages are intended to bring the steam into the ceramic 6 during stripping the mould. As shown in the drawings, electrical resistors 13 are also provided to ensure heating of the base to prevent condensation of the steam within these latter and thus to ensure that all the steam entering the base is brought in the form of vapour into contact with the clay slab from which a product such as a tile 5 is moulded.

At the moment of pressing of a clay slab, steam under pressure is injected through the layer of porous material 6. On contact with the cold clay, condensation of the steam occurs, which forms a thin skin of water facilitating stripping the mould.

As is clear from the foregoing, the invention brings a great improvement to the existing technique, by providing a mould having excellent stripping qualities, and perfectly resistant to phenomenon of wear in the course of time, whilst also being suitable for the production of articles of very different shapes, including articles having sharp angles.

Clearly, the invention is not limited to the single embodiment of this mould described above by way of example; on the contrary, it includes all variants. Thus, in particular, the steam supply structure could be different, the porous layer could be constituted, not by a ceramic, but by a synthetic resin, or stripping the mould could be aided

by injection of air under pressure into the porous layer, without exceeding the scope of the invention.



CLAIMS

1. A method of making articles from a mouldable material in the form of a wet paste, within a mould of which each mould portion (2) includes a base (3) of known type, for example of aluminium, provided with a lining (6) having an impression of complementary shape to that of the article (5) to be moulded, this lining being made of a porous abrasion-resistant material, characterised in that it consists in supplying steam under pressure, during the pressing phase, to a network of capillary holes (12) opening into the porous lining (6).
2. A method according to Claim 1, characterised in that the pressure of the steam brought into contact with the internal face of the two mould portions is at least equal to the pressure exerted by these latter on the material.
3. A method according to Claim 2, characterised in that the internal face of the two mould portions is supplied with saturated steam at 150 - 180°C under a pressure of the order of 20 bars (1 bar = 10^5 Pa).
4. A pressing mould for producing articles from a mouldable material in the form of a wet paste in accordance with the method of any one of Claims 1 to 3, characterised in that the base (3) of each mould portion (2) is lined with a layer (4) of epoxy resin having an impression of complementary shape to that of the article (5) to be moulded, into which the network of capillary holes (12) of the base is extended, this layer of resin (4) itself being coated, on its moulding face, with the lining layer (6) of porous abrasion-resistant material.



5. A mould according to Claim 4, characterised in that the lining layer (6) of porous abrasion-resistant material is made of a ceramic.
6. A mould according to Claim 5, characterised in that the ceramic lining layer has a base of alumina sintered to chromium-zirconium.
7. A mould according to Claim 4, characterised in that the lining layer (6) of porous abrasion-resistant material is of synthetic resin.
8. A mould according to any one of Claims 4 to 7, characterised in that the thickness of the lining layer (6) is between 0.5 and 1.5 mm.
9. A mould according to any one of Claims 4 to 8, characterised in that the base (3) of each mould portion has a network of channels (8) parallel to the surface of the mould portion into which opens the network of capillary holes (12), the channels being supplied from a distribution conduit, with flow balancing in each channel by means of an adjustment screw.
10. A mould according to any one of Claims 4 to 9, characterised in that the base (3) of each mould portion is equipped with heating resistors (13).
11. A mould according to any one of Claims 4 to 10, characterised in that the base (3) of each mould portion is equipped with a network of channels and capillary passages opening into the lining layer, this network being supplied by a source of compressed air, the supply being effected during stripping of the mould.