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⑦① Applicant: **Hybe Maskin System AB**
Blomängsvägen 32
S-305 90 Halmstad (SE)

⑦② Inventor: **Bergström, Henry**
Mossvägen 10
S-302 56 Halmstad (SE)

⑦④ Representative: **Nilsson, Lennart**
Lennart Nilsson Patentbyrå AB Box 271
S-311 01 Falkenberg (SE)

⑤④ **An apparatus for under compaction or ramming in a moulding machine.**

⑤⑦ The disclosure relates to an apparatus for the under-compaction or ramming of a mould model into a moulding box in the manufacture of sand moulds in a moulding machine, such as a high pressure moulding machine with a jolter, sand dispenser, membrane pressure plate etc., a mould board (2) with a model (1) being mounted on a raisable and lowerable portion (3, 4) in a cassette which is transportable to and away from the workplace in a moulding machine and forms a lower portion in a moulding box.

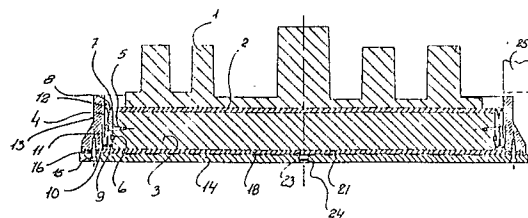


Fig 2

Description

The present invention relates to an apparatus for under compaction or ramming in a moulding machine, for example a high pressure moulding machine, with a jolter, sand dispenser, membrane pressure plate etc.

In the manufacture of moulds of sand or similar materials intended for a number of special products, it is desirable in many cases to be able to carry out under-compaction, or ramming, of the model into the mould sand in addition to all of the other operational phases which are usually implemented in the manufacture of the mould. Ramming is a desirable additional feature in the manufacture of moulds for products with channels and flanges or the like. Prior art moulding machines capable of ramming from beneath are restricted in their scope in such a manner that the ramming operation must be carried on the manufacture of every individual mould. This entails that ramming must be applied also in those cases when it is not actually necessary. Prior art machines for ramming in this context have proved to require considerable maintenance and recurrent repairs, which entail lengthy down-time periods and disruptions in the mould manufacturing process. Hence, these down-time periods and operational disruptions afflict not only the manufacture of moulds per se requiring ramming, but also the manufacture of moulds for which ramming is not necessary. Thus, in the event of down-time for repair and maintenance, it will not be possible to manufacture either the one or the other type of mould.

The object forming the basis of the present invention is to obviate or at least reduce the drawbacks inherent in prior art moulding machines which permit ramming.

This task is solved according to the present invention in the apparatus disclosed by way of introduction, in that a mould board with a model is mounted on a raisable and lowerable portion in a cassette which is transportable to and away from the workplace in the moulding machine and forms the lower portion of a moulding box. The cassette has a bottom with a cassette frame which forms a cylindrical wall for the portion carrying the mould board. A membrane is disposed on the bottom of the cassette for upward pressing of the portion carrying the mould board. The portion carrying the mould board is provided with a sliding frame for cooperation with the cylindrical wall, this sliding frame being fixedly secured in one or more plates which fill out the space between the mould board and/or the mould proper and the membrane. The cylindrical wall and the sliding frame are provided with mutually cooperating, travel restricting heels or bosses which determine the distance by which the portion carrying the mould board may be upwardly rammed. The cassette bottom is provided with a number of channels which are interconnected and are connectible to a pressure medium source, for example a compressed air source. The channels are in the form of a number of circular grooves which, by the

intermediary of radial grooves or channels, are in communication with one another and a central circular recess with a pressure medium inlet. A key is disposed between the sliding frame and the plate or plates which support the model.

The employment of the present invention makes possible compaction or ramming in a conventional moulding machine and, above all, as good as free alternation between the manufacture of moulds with ramming and the manufacture of moulds with no ramming. One of the crucial advantages inherent in the apparatus according to the present invention is, however, that the under-ramming process takes place fully independently of the moulding machine and that the switch between mould manufacture without under-ramming and mould manufacture with under-ramming requires but one extremely simple working operation by means of which a compression medium source, preferably compressed air, is coupled to the cassette intended for the under-ramming. This operational phase may be executed manually, semi- or fully automatically, by, for instance, a quick coupling for connection of the pressure medium source, for example a compressed air source, to the cassette. In addition, this operational phase may, in the moulding machine, initiate a working programme which includes the under-ramming. Thus, according to the present invention, the under-ramming is effected pneumatically.

The present invention will now be described in greater detail below, with particular reference to the accompanying Drawings. In the accompanying Drawings, Fig. 1 is a schematic top plan view of a cassette with an apparatus according to one embodiment of the present invention. Fig. 2 shows, on a different scale, a section taken along the line II-II in Fig. 1. Fig. 3 shows, on a different scale, a section taken along the line III-III in Fig. 1. Fig. 4 shows, on a different scale, a section taken along the line IV-IV in Fig. 1.

The embodiment of an apparatus according to the present invention shown on the Drawings is intended for the manufacture of a sand mould half of a model 1 which is disposed on a mould board 2. The mould board 2 is placed on a plate 3 of, for example, aluminium. A slide frame 4 is disposed about the mould board 2 and the plate 3, the slide frame 4 being secured in the plate 3 by means of bolts 5. Furthermore, the slide frame 4 is anchored in the plate 3 by means of one or more keys 6. On its upper side, the slide frame 4 is provided with a slide rail 7 which is fixed in the slide frame 4 by means of countersunk bolts 8. On its underside, the slide frame 4 is provided with a further slide rail 9 which is fixedly secured by means of countersunk bolts 10.

The slide frame 4 is provided with a sliding surface 11 for cooperation with a corresponding sliding surface 12 on a cassette frame 13 which extends about the slide frame 4 with its slide rails 7 and 9. The cassette frame 13 is fixed on a baseplate 14 by

means of bolts 15. Between the baseplate 14 and the cassette frame 13, there are disposed spacer washers 16 which may be provided on each bolt 15. As shown in Fig. 4, at each corner, the parts of the cassette frame 13 are interconnected by means of bolts 17. A membrane 18 of, for example, rubber is disposed between the baseplate 14 and the plate 3 which supports the mould board 2. The membrane 18 is placed under tension between the baseplate 14 and the cassette frame 13 and is then anchored by means of the spacer washers 16 and the bolts 15 which extend through the membrane 18.

While Figs. 2, 3 and 4 show solely one mounting arrangement of bolts of the different types employed, it will be obvious to the skilled reader that the bolts are disposed with spacing throughout the circumference of the different parts included in the apparatus according to the present invention.

Fig. 2 more clearly illustrates the interaction between the sliding surface 11 of the slide frame 4 and the sliding surface 12 of the cassette frame 13. Both of the sliding surfaces 11 and 12 terminate by means of an arrest boss or heel 19 on the sliding surface 11 and an arrest boss or heel 20 on the sliding surface 12. The distance between the heels 19 and 20 constitutes the stroke length of the cassette frame 13 and the parts carried thereby.

A number of channels 21 are disposed in the baseplate 14, these channels being in communication with one another by the intermediary of radial channels 22. The circular central recess 23 which forms the centre of the channel system 21, 22 displays an inlet 24 which may be adapted to the dimensions of a quick coupling of any type for connection of the channel system 21, 22 and 23 to a suitable pressure medium source, for example a compressed air source. When compressed air is applied, the rubber membrane 18 will, as far as the distance between the heels 19 and 20 permits, urge the plate 3 with the model 1 and the mould board 2, together with the parts fixedly retained on the plate 3, into a mould box which is intimated at 25 and which connects to the cassette frame 13 by the intermediary of a ring. The compressed air admitted into the space between the membrane 18 and the baseplate 14 may be of a pressure of the order of 15 bar, while the counterpressure on the membrane pressure plate on the opposite side of the moulding box may be of the order of 12 bar. Naturally, these figures are given solely by way of example of those pressures which may be deemed suitable, even though other pressure levels may also be applied.

In a moulding machine, the coupling of the inlet 24 to the pressure medium source may be effected manually, semi-automatically or fully automatically, and, simultaneously with the above-mentioned connection, the working programme of the moulding machine may be initiated in such a manner that the under-ramming operation is carried out. Otherwise, no under-ramming operation need be executed. Thus, it is only on the occurrence of a cassette of the type and construction described in the foregoing that the moulding machine need carry out an under-ramming operation.

Naturally, there is nothing to prevent the mould

board and the plate 3 from being configurationally adapted to a model 1 which, in addition to positive mould details, is provided with negative mould details in a per se conventional manner.

The present invention should not be considered as restricted to that described above and shown on the Drawings, many modifications being conceivable without departing from the spirit and scope of the appended Claims.

Claims

1. An apparatus for under-compaction, or ramming, in a moulding machine, for example a high pressure moulding machine with a jolter, sand dispenser, membrane pressure plate etc., **characterised in that** a mould board (2) with a model (1) is mounted on a raisable and lowerable portion (3, 4) in a cassette which is transportable to and from the workplace in a moulding machine and forms a lower portion in a moulding box.

2. The apparatus as claimed in claim 1, **characterised in that** the cassette has a bottom (14) with a cassette frame (13) which forms a cylindrical wall for the portion (4) supporting the mould board (2).

3. The apparatus as claimed in claim 2, **characterised in that** a membrane (18) is disposed on the bottom (14) of the cassette for upward pressing of the portion (3, 4) supporting the mould board (2).

4. The apparatus as claimed in claim 1 to 3, **characterised in that** the portion (3, 4) supporting the mould board (2) is provided with a slide frame (4) for cooperation with the cylindrical wall, said slide frame (4) being anchored in one or more plates (3) which fill out the space between the mould board (2) and/or the model (1), as well as the membrane (18).

5. The apparatus as claimed in claim 4, **characterised in that** the cylindrical wall (12) and the slide frame (4) are provided with mutually cooperating, movement restricting bosses or heels (19, 20) which determine that distance by which the portion (3, 4) carrying the mould board (2) is upwardly pressable.

6. The apparatus as claimed in claims 1 to 4, **characterised in that** the cassette bottom (14) is provided with a number of channels (21, 23), which are interconnected to one another and are connectible to a pressure medium source, for example a compressed air source.

7. The apparatus as claimed in claim 6, **characterised in that** the channels (21) are in the form of a number of circular grooves which, by the intermediary of radial grooves or channels (22) are in communication with one another, and a central, circular recess (23) with a pressure medium inlet (24).

8. The apparatus as claimed in claim 4, **characterised in that** a number of keys (6) are

arranged between the slide frame (4) and the plate or plates (3) which support the mould board (2) and the model (1).

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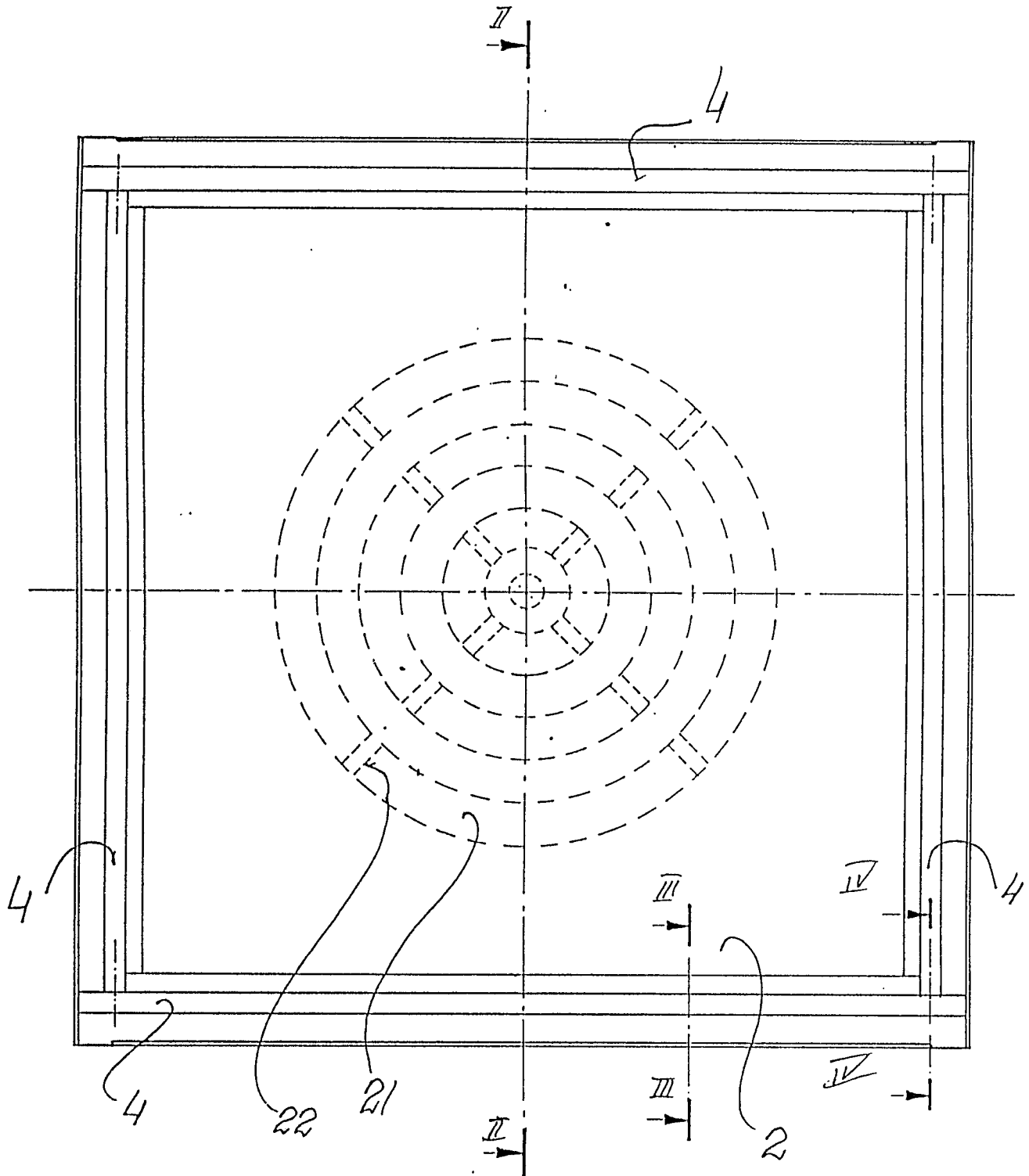


Fig 1

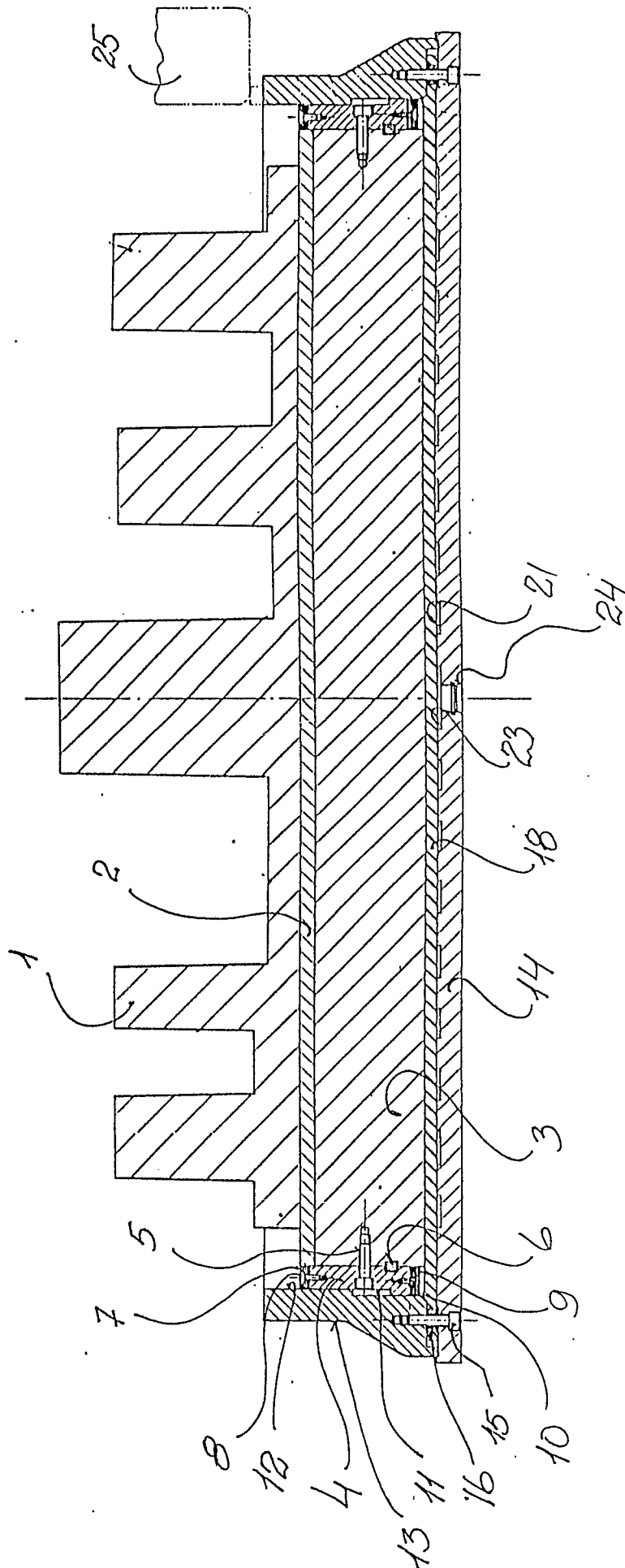


Fig 2

