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(54) **Vibrating table for vibrating presses**

(57) A vibrating table employed in vibrating presses for the moulding of concrete artefacts is described. Said vibrating table, comprising an appropriate actuating and control system, is adapted to make the mould filling operations with mixtures for the preparation of construction materials and of concrete more effective, in general.

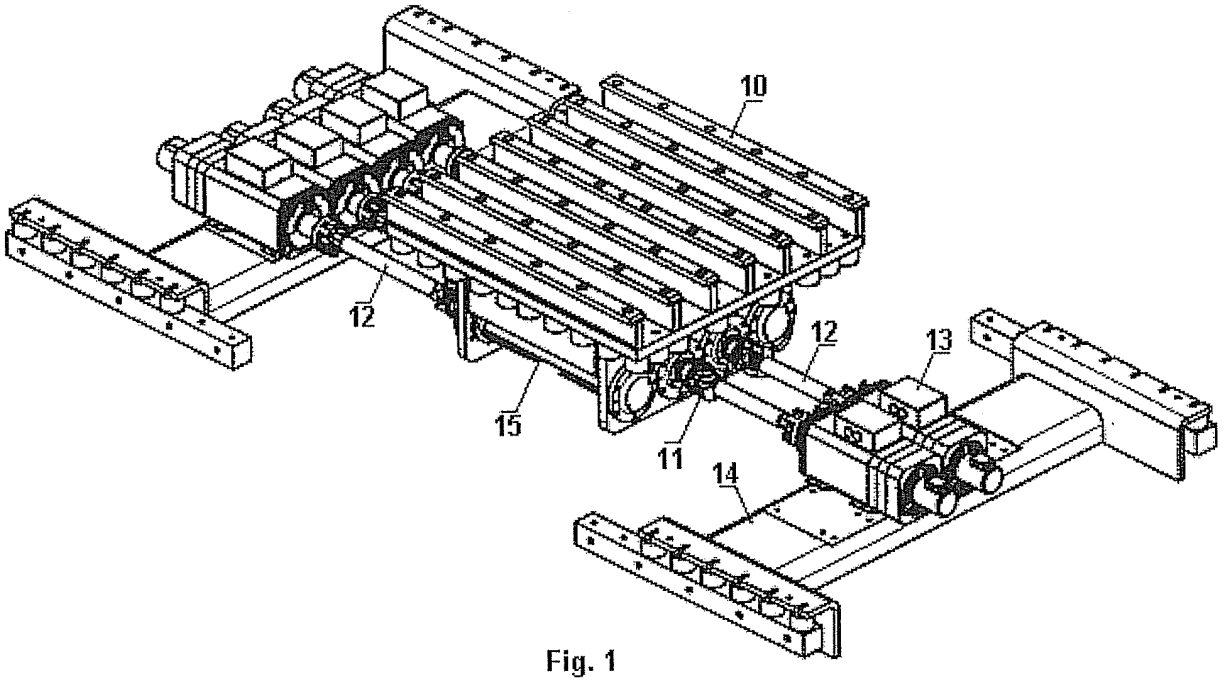

Fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of apparatuses for the production of prefabricated construction elements and specifically to the field of vibrating presses for the moulding of concrete artefacts.

STATE OF THE ART

[0002] In the field of the production of concrete artefacts, the most used technique is that comprising moulding by means of vibrating presses.

[0003] The moulding process generally comprises the filling of specific moulds with a viscous granular mixture of the material to be employed, the levelling of said viscous material - for example, by means of appropriate filling and shaking means so as to apply considerable vibratory forces to said moulds - and the subsequent application to said moulds of a considerable pressure, induced by specific vibrators, so as to expel the water present in the viscous mixture and promote the compacting thereof. The aforesaid moulding process is generally performed by means of vibrating presses which are provided with a horizontal table induced to vibrate by appropriate vertical action vibrating means. The moulds for making concrete artefacts are placed on said horizontal table. Said moulds are filled with the viscous pre-mixed concrete mixture - or similar construction material - by appropriate dispensers during their movement on the horizontal table of said press. The filling of these moulds occurs with a decreasing amount of material as the distance of the shapes of the products obtained in the moulds from said dispensers increases, the vibratory motion to which the moulds are subjected by the horizontal table on which they are placed, favours and makes easy the distribution of the viscous construction material within the moulds themselves, thus overcoming the disuniformity induced by the described nonhomogeneous filling. In order to further improve the homogeneous filling of the moulds, the solution of subdividing the horizontal vibrating table into two independent halves subjected to two vibrations modulated in different manner is often adopted. In this manner, by regulating the amplitude, the frequency and the duration of the vibration of the half table farthest from the dispenser to higher values with respect to regulating values of the closest half table, the filling of the mould and thus the volume mass of the compacted products resulting from the process may be levelled more precisely.

[0004] This solution, along with others belonging to the state of the art, however displays the drawback of requiring electronic circuits and complex mechanical constructions which have repercussions on the easiness of use and on the cost of the final apparatus.

SUMMARY OF THE INVENTION

[0005] The present invention relates to a vibrating table for vibrating presses used in the moulding of concrete artefacts. Said vibrating table, comprising an appropriate actuating and control system, is adapted to make the mould filling operations with mixtures for the preparation of construction materials, and of concrete in particular, more effective.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

Fig. 1 Axonometric view of the vibrating table for vibrating presses according to the present invention.
Fig. 2 Plan and perspective view of a preferred embodiment of the vibrating table for vibrating presses according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0007] Fig. 1 shows in detail the vibrating table for vibrating presses for the production of construction materials, such as concrete and the like, according to the present invention.

[0008] It comprises a single vibrating table 10 associated to a plurality of eccentric shafts 15 in turn associated, by means of appropriate connection means 11, to drive shafts 12 each connected, in turn, to a motor 13 fixed to appropriate supporting means 14.

[0009] Said motors 13 are in turn controlled so as to modulate and vary the type of vibration to which said vibrating table 10 is subjected, thus adapting the operating mode of the apparatus according to the present invention to the needs of the material to be employed and the type of artefacts to be manufactured.

[0010] In a preferred embodiment of the apparatus according to the present invention, said eccentric shafts 15 are six in number. Each of said eccentric shafts 15 is connected to a motor 13 by means of said drive shafts 12, the motor is electric, preferably of the type controlled by inverter and having the rotation speed regulated by an appropriate electronic control module, preferably associated to an encoder device for reading the number of rounds per minute and the instantaneous angular position of the shaft of said motor (13).

[0011] Said electronic control module allows the operator to set the revolution speed of each shaft in terms of angular speed of the axis and reciprocal angular offset between one shaft and the other. In this manner, it is possible, by composing the centrifuge forces developed by each shaft, to obtain a component of the resulting force applied to said vibrating table having vertical direction, alternating sign direction and adjustable intensity, so as to develop the desired unidirectional vibratory effect in the desired part of said vibrating table.

[0012] In the mentioned preferred embodiment of the

apparatus according to the present invention, drive shafts 12 associated to said vibrating table are arranged as shown in Fig. 2. Four drive shafts 12 on the first side of the vibrating table are such that the two central shafts have a shorter length with respect to the two peripheral shafts, while the two shafts on the second side of said vibrating table are arranged in the two central positions and have the same length as the two central shafts on the first side of the vibrating table. In this manner, the vibrating table will be subjected to a higher resulting vertical force in one half of the table with respect to the other half. Therefore, while maintaining the position of the dispenser centred and symmetric during the filling of the mould, as an effect, the filling of the mould itself will be facilitated as the distance of the dispenser increases and, therefore, the amount of viscous construction material, e.g. "soft" concrete, which enters said moulds, may be levelled.

[0013] Preferably, the structure of said vibrating table 10 is made of construction steel plates, but other materials having similar features of robustness and machineability may be employed.

[0014] Eccentric shafts 15 must be characterised by suitable strength and robustness and may be made of special steel, e.g. starting from a laminate of the commercial type, which is milled, turned, refaced and has been locally thermally treated where required. Said eccentric shafts 15 are preferably supported by bearings accommodated within appropriately lubricated fluid-tight supports.

[0015] Connection means 11, associated to said Cardan drive shafts 12, may preferably consist of appropriate universal joints. Said Cardan drive shafts 12, in turn, may be of the tubular type, adapted for high rotation speeds, and dynamically balanced.

[0016] Supporting means 14 comprise welded mechanical structures adapted to support the electric motors and perform the structural connection with the main structure of the vibrating press according to the present invention.

[0017] Regarding employed electric motors 13, these are preferably of the asynchronous lamellar type of high specific power provided with a servo ventilation system. They are further provided with a contactless rotary inverter for detecting the rotation speed and the instantaneous angular position of the motor axis. Said electric motors 13 are preferably driven by appropriate inverters, e.g. of the vectorial type, adapted to ensure the regulation in accordance with the various required operating speeds by varying the supply current frequency of the motors themselves.

[0018] An appropriate programmable controller provided with a specific control software will control said inverter so as to define the operating profiles of the entire system, by means of the management of parameters which are adjustable by the system user, such as for example:

- contemporaneity or consequentiality of the steps.
- Electric motor rotation speed.
- Relative angular positions of the motor axes and thus of the motor axis-drive shaft-eccentric shaft kinematic chain and their progress in time.
- Accelerations and decelerations of the single shafts.

Claims

1. A vibrating supporting device for vibrating presses comprising a metal table (10) associated to a plurality of eccentric shafts (15) in turn associated, by means of appropriate connection means (11) to a plurality of drive shafts (12) each connected in turn to a motor (13) anchored to appropriate supporting means (14).

2. A device according to claim 1, **characterised in that** said motors (13) are of the electrical type.

3. A device according to claims 1-2, **characterised in that** said motors (13) are driven by driving inverters.

4. A device according to claim 3, **characterised in that** said driving inverters of said motors (13) are associated to at least one electronic control module adapted to regulate the rotation speed in terms of angular speed of the axis of each motor (13) and reciprocal angular offset between shafts of different motors.

5. A device according to claim 4, **characterised in that** said at least one electronic control device is associated to an encoder type device for reading the number of rounds per minute and the instantaneous angular position of the shaft of said motor (13).

6. A device according to claims 4-5, **characterised in that** said electronic control module regulates the parameters related to said motor (13) selected from the group comprising: contemporaneity or consequentiality of the steps; rotation speed of said electric motors (13); relative angular positions of the motor axes and thus of the motor (13) axis - drive shaft (12) - eccentric shaft (15) kinematic chain and their progress in time; accelerations and decelerations of the single shafts of said motors (13).

7. A device according to claims 2-6, **characterised in that** said electric motors (13) are of the of the asynchronous lamellar type of high specific power and are provided with a servo ventilation system.

8. A device according to claims 1-7, **characterised in that** said drive shafts (12) associated to said metal table (10) are six in number, four of which are arranged on a first side of said metal table (10) and two of which are arranged on the side opposite to

said first side.

9. A device according to claim 8, **characterised in that** said four drive shafts (12) arranged on one first side of said metal table (10) are such that the two central shafts have a shorter length with respect to the two peripheral shafts, while said two shafts arranged on the side opposite to said first side are arranged in the two central positions and have the same length as the two central shafts on said first side of said metal table (10).

10. A device according to claims 1-9, **characterised in that** said vibrating table (10) is made of construction steel plates.

11. A device according to claims 1-10, **characterised in that** said eccentric shafts (15) are formed of special steel of the commercial type, which is machined and thermally treated.

12. A device according to claims 1-11, **characterised in that** said eccentric shafts (15) are supported by bearings accommodated in appropriately lubricated fluid-tight supports.

13. A device according to claims 1-12, **characterised in that** said drive shafts (12) are of the Cardan type.

14. A device according to claims 1-13 **characterised in that** said connection means (11), associated to said drive shafts (12) are made by appropriate universal joints.

15. A device according to claims 1-14, **characterised in that** said drive shafts (12) are of the tubular and dynamically balanced type.

16. A device according to claims 1-15, **characterised in that** said supporting means (14) comprise welded mechanical structures adapted to support said motors (13) and perform the structural connection with the main structure of the vibrating press.

17. A vibrating press for the production of construction materials **characterised in that** it comprises a vibrating supporting device according to claims 1-16.

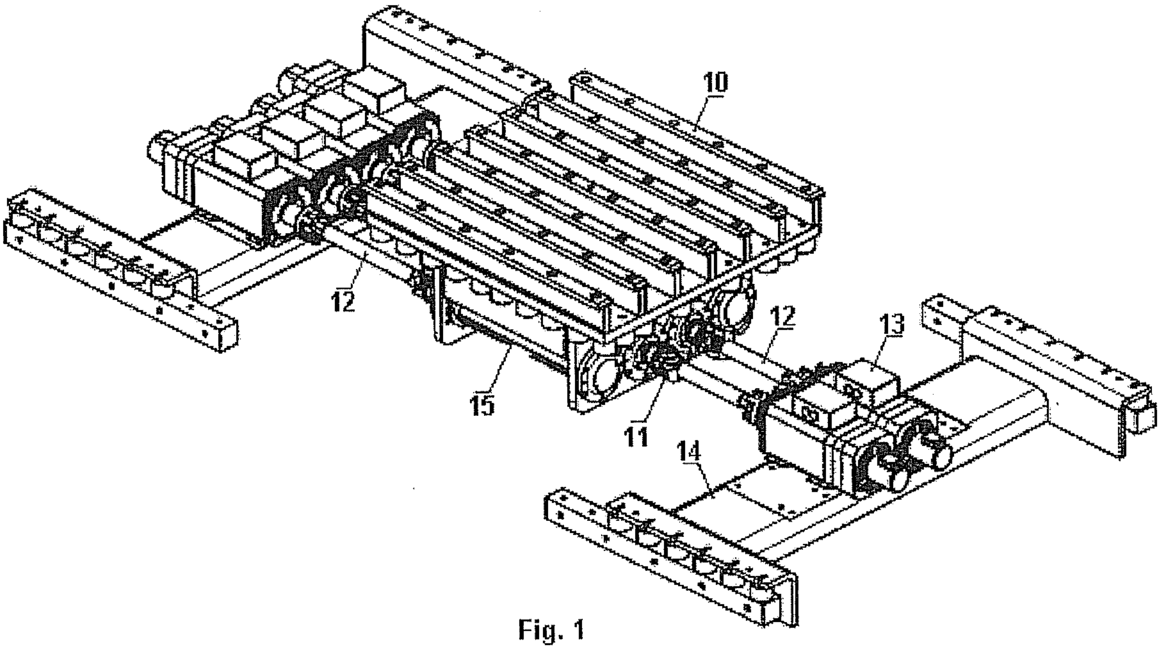
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Fig. 1

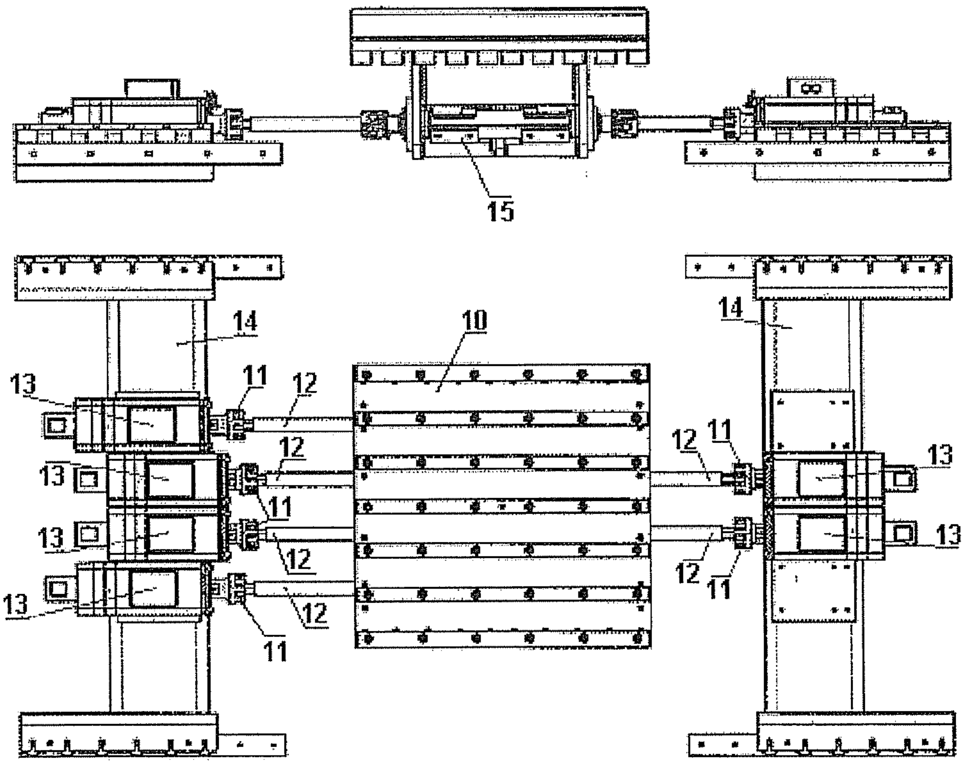
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Fig. 2