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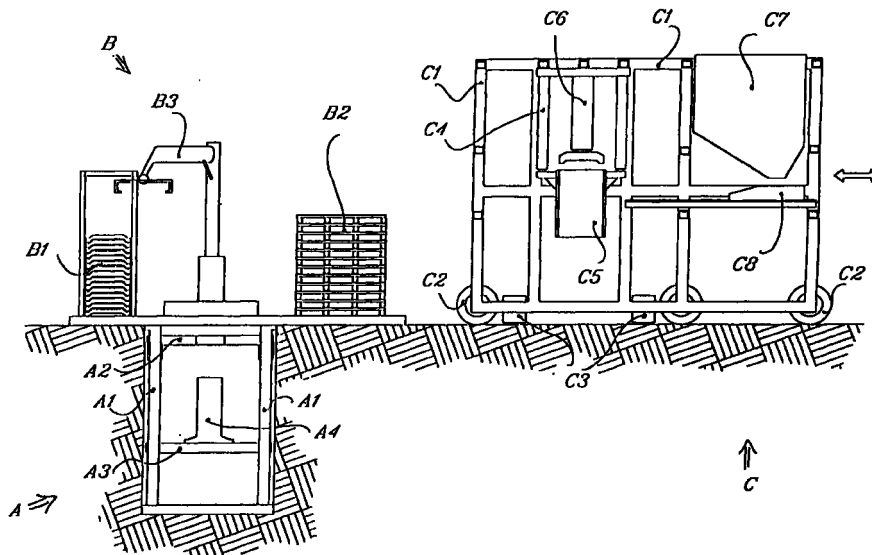
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(54) **Multifunctional system producing concrete prefabricated elements**

(57) This new multifunctional system producing concrete prefabricated elements consists of a part in a pit (A), a vibratory press (C) positioned at the floor level, a distributor unit (B) of pallets and/or bottoms. The part in the pit includes a plane sliding vertically and a raising platform (A3) for the cores (A4) of the mold, whereas the vibratory press (C) at the floor level is movable and provided with wheels (C2) independently from the part in the pit (A) and from the distributor unit (B). Said vibra-

tory press (C) comprises a rotating support which slides vertically for the shells (C5) of the mold (C), a hopper (C7) with a box (C8) for the concrete, a press (C6) for compacting the concrete in the mold provided with rotating boom (B3) which slides vertically and takes the pallets (B2) or the bottoms (B1) and lays them on the sliding plane of the part in the pit (A).



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Description

[0001] This patent relates to the field of building equipment for the production of concrete prefabricated elements, buildings, conduits, road building elements, and particularly concerns a new multifunctional system for the realization of concrete prefabricated elements.

[0002] The concrete prefabricated elements are produced with different and changeable techniques according to the manufactured goods required.

[0003] Leaving aside the prefabricated elements of great dimensions such as prefabricated girders, the other elements as pipes, drainpipes, traps, traffic cones, tanks, pipe fittings, curbs, are produced using two methods which differ each other for the shakeout system involving the use of two different equipment.

[0004] As a matter of fact, the first one, called turnover shakeout, includes a system provided with a self-propelled machine which supports the hopper for the concrete to which a mold is hinged. At first, the mold is filled with concrete, vibrated and possibly compressed, then it is rotated and rested on the ground, consequently it is raised obtaining in this way the prefabricated element. After the laying of the element the machine of the system moves and gets ready for producing another element which will rest next to the first one. There are systems with immovable turnover shakeout, in this case the prefabricated element just produced is shaken out on a pallet and shifted in the seasoning area through an underlying trolley. The machine is conceptually identical except that it is fastened on the floor. Therefore, it is the product which shifts on the pallet, this operation has to be carried out carefully in order to avoid vibrations or shakes which could fissure the prefabricated element just produced. These machines both self-propelled or fixed, are usually called vibratory finishing machines or turnover vibratory press if they are provided with a press.

[0005] The second producing method, called direct shakeout, includes a system consisting of several parts: a platform which slides upward with respect to the external shell of the mold, a bed which slides vertically and is provided with a core which slides downward in a pit, and a press. These machine are usually called tuyeres. A bottom is positioned on the sliding bed which is adjusted at a proper height. Around said bottom the shell of the mold is dropped and its core is raised up. The concrete is cast in the space between the shell and the core, the mold is vibrated and the concrete is compressed.

[0006] When the concrete is enough compact the press and the shell are raised up, the core is lowered and the prefabricated element, which is on the bottom, is picked up, slid and positioned in the seasoning area.

[0007] Therefore, this second producing method consists of a fixture with a part built in the pit and the other part fixed so that the press and the shell are perfectly lined up with the core.

[0008] Each systems cited above is suitable for the

production of a particular set of prefabricated elements. Said systems are very expensive and require fixed constructions which differ for their fixture.

[0009] It follows that, on one hand, the firms set up either the former or the latter systems specializing in particular products, or, on the other hand they set up both the systems in two different areas which are used alternatively according to the market requests with a waste of space and money.

[0010] The subject matter of this patent is a new system which integrates and improves the parts and the functionality of the above mentioned systems.

[0011] The new system consists mainly of a part in a pit and two parts above the floor level.

[0012] The part in the pit comprises a vertically sliding plane and a lifting platform on which the cores of the mold are assembled.

[0013] The two parts above the floor level include a wheeled structure called vibratory press and a unit which allots pallets and bottoms.

[0014] The part in the pit, as said, consists of four columns on which two platforms slide.

[0015] The upper platform is used for laying down pallets and bottoms, it is centrally holed and vertically movable so that the pallet or the bottom are adjusted according to the height of the product to carry out. Said platform is vertically slid by means of hydraulic rams which are provided with locking device so that the platform during the execution of the product is immovable.

[0016] The lower platform supports the several cores of the mold which are fixed by means of screws or bolts. Some conic projections on the platform allow the automatic centering of the core respect to the platform. It is possible to provide for some vibrators to be applied inside the core for the compaction of the concrete.

[0017] Several and different cores can be positioned on the lower platform according to the different productions.

[0018] Also the lower platform is vertically slid by means of hydraulic rams, in this way it can move upwards to carry the core over the lower platform and it can execute the product or convey the core completely under the level of the lower platform so that the prefabricated element, just performed, is released.

[0019] Both the platforms are checked in their vertical movement by means of torsional bars with pinions meshing on racks which are fixed in the sides of the pit so as to ensure the horizontal position of each platform both when the platforms are stopped and when they are moving.

[0020] The wheeled structure consists of a set of vertical rods which ensures the solidity and the positioning of the supported parts, a feeding device for the concrete, a vertical press, some vibratory devices to compact the concrete, a centrally holed platform which rotates and slides vertically to apply the various molds and shells.

[0021] Said wheeled structure is provided, in its

lower part, with jaws positioned on supports fixed at the floor for the right and stable positioning of the structure with respect to the part in the pit.

[0022] The molds and the shells are assembled on the appropriate hooks of the platform, said platform rotates around the horizontal axle and slides vertically according to the producing method to be used or it slides only vertically for the shakeout of the prefabricated element.

[0023] The vertical press is positioned exactly over the position of the shell or of the mold and it is provided with a support for the various molders according to the item to produce.

[0024] The feeding device of the concrete comprises a hopper and a sliding box. The hopper pours the right quantity of concrete into the box. The box slides over the mold pouring the concrete, then it returns in the previous position so as to give space to the press.

[0025] The distributor unit consists of a bearing and rotating arm, pliers and two jaws and is provided with two tanks or vertical structures laterally positioned which contain respectively the bottoms and the pallets. The rotating arm can move vertically so that it can be positioned at the height in which the pallet or the bottom inside the tank has to be taken, and it can be positioned on the part of platform in the pit.

[0026] The distributor unit is fixed on the floor near the part in the pit, preferably in the opposite position with respect to the side in which the self-propelled structure slides.

[0027] The new structure, built as above mentioned, can produce concrete prefabricated elements of different kind: by means of turnover shakeout, direct shakeout or by means of shakeout directly on the seasoning area or on a pallet or on a bottom.

[0028] The new structure can be used as fixed structure or as self-propelled structure simply changing the molds and using one, some or all the parts of the new structure.

[0029] The replacement of the molds and of the cores is very easy and quick since moving the frame of the vibratory press towards the pit it possible to obtain a comfortable access to the supports of the molds and to the platforms.

[0030] The removing of the wheeled vibratory press allows an easier extraction of the concrete prefabricated element just carried out.

[0031] The wheeled structure and the pallet distributor unit are used for producing prefabricated elements with turnover shakeout.

[0032] The part in the pit of the new structure has the function of being just a temporary point of support: the lower platform remains lowered so that a possible core cannot project from the upper platform which is positioned at the floor level.

[0033] The pallet distributor unit lays a pallet over the upper platform while the wheeled structure is positioned near the part in the pit.

[0034] The mold of concrete is loaded and vibrated, if it is necessary the concrete in the mold is compressed by the press.

[0035] When the correct compaction of the concrete is reached, the wheeled structure moves forward to the pallet positioned on the upper platform of the part in the pit, the mold is rotated laying the prefabricated element just produced on the pallet.

[0036] Then, the overturned mold is raised extracting the product, the wheeled structure moves from its position and the mold is straightened in order to produce the following element. A forklift or a crab or another machine takes the pallet, with the prefabricated element just produced on it, and conveys it to its seasoning area together with the other elements. In other cases, when there is the risk that the concrete element can come out the mold during the rotation, the distributor unit lays a pallet even over the mold instead of over the platform. As soon as the wheeled structure has finished the filling it moves forward to the upper platform of the part in the pit, the press is raised, the distributor unit lays a pallet over the mold and four jaws block the pallet to the mold. The mold is rotated laying the pallet on the platform with the prefabricated element just produced and the jaws are open.

[0037] In order to obtain prefabricated elements produced by turnover shakeout a wheeled structure with the proper rotating mold is used so as to avoid the vibrations and stresses of the transport by pallet to the seasoning area.

[0038] Essentially, the wheeled structure moves along the seasoning area with regular gaps and shakes out the prefabricated element just produced directly on the floor.

[0039] Thanks to this process the prefabricated elements which can be damaged during the transport by forklift truck or crab are produced and laid directly in the seasoning area.

[0040] In order to produce prefabricated elements by direct shakeout all the part of the new system are being used: both the platforms in the pit, the distributor unit and the wheeled structure.

[0041] Initially, the wheeled structure is moved away from the platforms.

[0042] The distributor unit lays the bottom on the lower platform positioned at a proper height.

[0043] The wheeled structure moves so as to find itself over the platforms, then it pitches the jaws on the supports fixed at the floor so as to take a right working position with respect to the platforms.

[0044] The lower platform of the part in the pit is raised so as to put the core to which it is connected in the right position over the upper platform. At the same time, the wheeled structure provides for lowering the shell of the mold which is in central position respect to the platform, the bottom and the core.

[0045] The hopper unloads the concrete into the box and the box unloads it into the mold between the

shell and the core.

[0046] Both the shell and the core or only one of them are vibrated to compact properly the concrete and if it is necessary the press compress again the concrete. Reached the right compaction the press and the shell are raised while the platform with the core is lowered releasing in this way the concrete prefabricated element just produced.

[0047] The wheeled structure opens the jaws and moves from over the platforms allowing the taking of the prefabricated element which is conveyed to the seasoning area.

[0048] The cycle restarts with the distributor which lays a new bottom on the upper platform and with the wheeled structure which returns back over the platforms.

[0049] The enclosed illustration shows, by way of example, but not limitative, an embodiment of the invention.

[0050] In the figure a sectional view of the parts of the new system are schematized: the part in the pit (A), the distributor unit of bottoms and pallets (B) and the wheeled structure (C).

[0051] The part in the pit (A) consists of vertical columns (A1) in which the two platforms (A2, A3) slide, the upper platform (A2) is centrally holed whereas the lower one (A3) supports the core (A4) of the mold.

[0052] The distributor unit (B) of pallets and bottoms is positioned aside the pit (A). Said distributor unit (B) is provided with two different boxes or cases for the bottoms (B1) and the pallets (B2) and with a movable boom or crab (B3) which takes the bottom (B1) or the pallet (B2) and sets it on the upper platform (A2) of the part in the pit (A).

[0053] The movable structure (C) consists of a metallic frame (C1) assembled on wheels (C2) so as to move; some jaws (C3) to allow the anchorage of the position on the part in the pit (A); a set of levers (C4) to support the movement of the shell (C5) or of the overturning mold; a press (C6) to compact the concrete on the mold; a hopper (C7) and a sliding box (C8) to pour the concrete into the mold.

[0054] The above are the basic outlines of the invention, on the basis of which the technician will be able to provide for implementation; therefore any change which may be necessary upon implementation is to be regarded as completely protected by the present invention.

[0055] With reference to the above description and the attached drawing, the following claims are put forth.

form for the cores of the mold, and the latter includes a rotating support which slides vertically for the shell of the mold, a hopper with a box for the concrete, a press to compact the concrete in the mold and some vibratory devices of the mold, said vibratory press is movable and provided with wheels independently from the part in the pit and the distributor unit.

2. Multifunctional system producing concrete prefabricated elements, according to claim 1, characterized in that it includes a distributor unit provided with rotating boom which slides vertically in order to take the pallets or the bottoms and to lay them on the sliding part of the pit.
3. Multifunctional system producing concrete prefabricated elements according to claims 1, 2 characterized in that the vibratory press can work independently as separated unit producing prefabricated elements by turnover shakeout as well as together with the part in the pit and the distributor unit of pallets and/or bottoms to produce prefabricated element by direct shakeout.
4. Multifunctional system producing concrete prefabricated elements according to claims 1, 2, 3 characterized in that the vibratory press is provided with molds which can be used both for the direct and the turnover shakeout.
5. Multifunctional system producing concrete prefabricated elements according to claims 1, 2, 3, 4 characterized in that the vibratory press, during the production of the prefabricated element by direct shakeout, moves away from the part in the pit and from the distributor unit of pallets and bottoms for allowing the taking of the prefabricated element just produced, as well as for positioning the bottom and the pallet and for replacing the shell, the mold and the core.
6. Multifunctional system producing concrete prefabricated elements according to claims 1, 2, 3, 4, 5 characterized in that the vibratory press is provided with jaws, which can be locked, positioned on the supports fixed at the floor so as to obtain a correct and stable position with respect to the part in the pit.

Claims

1. Multifunctional system producing concrete prefabricated elements characterized in that it is provided with a part in the pit and a movable vibratory press sliding on the floor level and wherein the former includes a vertically sliding plane and a lifting plat-

