Apparatus for molding concrete columns wherein an elongated shell has a pair of longitudinal sectors which are hinged to swing between closed and open positions so that the finished concrete column may be removed from the shell. Latches are provided for temporarily locking the sectors in the closed position and the periphery of the shell is provided with hooks which enable the shell to be transported between concrete column processing stations. A supporting jig separate from the shell permits the shell to be supported on the cross members of the lifting track of a fork lift tractor.
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APPARATUS FOR MOLDING CONCRETE COLUMNS

BACKGROUND OF THE INVENTION

This invention relates to improved apparatus for molding concrete columns, particularly to such apparatus which may be used in conjunction with fork lift tractors for transporting the apparatus between concrete column processing stations.

While it is known to mold concrete columns in steel jackets or shells, by filling the shell with concrete and then stripping the shell from the concrete when the concrete has set sufficiently, the usefulness of such apparatus has been severely limited because of the time consumed in stripping sectors of the shell from the concrete column and because of the difficulty in moving the shell containing the concrete between stations in a concrete column processing operation, for example, between a filling station and a curing or storage station. The problem becomes especially acute when the concrete columns to be molded and transported have considerable size and weight, one common concrete column being 8-10 feet tall and 20 inches in diameter. The structural strength and dimensions of brackets, jigs and the like, used to move the columns then become critical. For example, the more massive the column, the more important it is that the column be well supported at points near its top and bottom on the fork lift tractor, so that it will not wobble and become disengaged.

Although it is known to provide hinged longitudinal sectors in concrete column forms, so that the form or shell may be stripped from the column without removing the sectors of the shell, the hinged sectors have been of such size as to swing open too far, such that they take up too much space when in the open position. Space saving considerations are significant in the manufacture of concrete columns since the shells containing the concrete must be positioned close to one another when the curing takes place in an autoclave enclosure. If the sectors of the shell must be swung open widely in order to remove the concrete column, the column will thereafter have to be moved into position closer to other columns in order to conserve space within the autoclaving enclosure. But if the sectors swing open only a minimal distance, the column thereafter need not be moved, thus saving a step in the overall processing.

Moreover, since the shells containing the concrete must be transported at some point in the processing of the columns, the shells must be adaptable for ease of transportation, particularly so that a conventional fork lift tractor may be utilized. The known apparatus for molding concrete columns fail in the foregoing and other respect and have not been adapted to provide the foregoing and other advantages.

OBJECTS AND SUMMARY

Accordingly, an object of the invention is to provide a new and improved apparatus for molding concrete columns wherein a molding jacket or shell may be quickly filled with concrete and transported to another station in the processing, without the need for again moving the concrete column after the shell has been removed therefrom.

Still another object of the invention is to provide a new and improved apparatus for molding concrete columns which is adaptable, with respect to any of the usual shell sizes, for elevation and transportation by existing fork lift tractors, and which can be utilized with a minimum of supervision.

These and other objects, features and advantages of the invention will be apparent from the specification which follows.

The apparatus of the invention includes an elongated shell having a pair of hingeably mounted longitudinal sectors, wherein the sectors are adapted to swing between a closed position and an open position so that the finished concrete column may be removed from the shell. Means are also provided for temporarily locking the sectors in the closed position. A plurality of hooked members mounted on the periphery of the shell cooperate with an external lifting force, such as the lifting track of a fork lift tractor, so that the shell containing the concrete may be transported between concrete column processing stations. In a preferred embodiment, the apparatus includes as a separate element a supporting jig which is adapted on one side to receive the hooked members of the shell and on the opposing side to be supported on the cross members of the lifting track of a fork lift tractor.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

DETAILED DESCRIPTION

For a fuller understanding of the nature and objects of the invention, reference is had to the following description taken in conjunction with the accompanying drawing, in which:

FIG. 1 is a partly schematic side view of a conventional fork lift tractor upon the lifting track of which is mounted apparatus of the invention;

FIG. 2 is a partly schematic top view of apparatus of the invention;

FIG. 3 is a partly fragmentary section along the line 3—3 of FIG. 2 showing apparatus of the invention in normal vertical position;

FIG. 4 is a detail of a hinge portion of the apparatus shown in FIG. 3, somewhat enlarged;

FIG. 5 is a detail of a locking means of the apparatus shown in FIG. 3, also somewhat enlarged; and

FIG. 6 is a partly schematic, perspective view of a supporting jig of the invention.

With reference to the drawing, an elongated jacket or shell 11, of steel or reinforced plastic, for example, is divided into the three longitudinal sectors 12, 13 and 14. While the shell is illustrated as cylindrical in shape, it will be understood that it could take other geometrical forms, such as a polygon of any desired number of sides. With reference particularly to FIG. 2, it will be noted that there is hingeably attached to the larger sector 12 two smaller sectors 13 and 14, with their corresponding hinges 15 along the connecting edges of the sectors. When the shell is cylindrical, the hinged sectors desirably comprise about one-quarter each of the total circumference of the shell, since it has been found that sectors of greater length take up so much space when swung outwardly that the concrete columns when removed from the shells, must thereafter again be moved to take up the space lost when the sectors were opened. Accordingly, a substantial saving of space is
3

achieved when each of the two hinged sectors subtend about 90° of arc. The hinged sectors 13 and 14 are held in a closed position with respect to sector 12 by a series of latches 16, which may be in any desirable form, such as the toggle latch shown. Sectors 13 and 14 swing between closed and open positions, the open position being schematically and generally indicated by 17 in FIG. 2. If desired, circumferential or segmented clamps or bands 18 may be provided along the length of the shell to reinforce the shell, and the upper end of the shell may be fluted as at 19 to accommodate concrete filling equipment.

If the concrete column is to be manufactured as concrete pipe rather than as a solid member, a core member (not shown) is conventionally centrally positioned in the empty shell before the concrete is poured into the shell. The concrete is then tamped down into the shell around the core and the core is removed. In the next step of the processing, the shell containing the concrete column or pipe is moved to a curing site, such as an autoclaved enclosure. Accordingly, some means must be provided to facilitate elevation and moving of the filled shell.

For this reason, there are affixed on the periphery of the larger sector of the shell, hooked members here shown as a pair of plate-like members 21 spaced apart approximately parallel by a pair of struts 22. Projecting from the edges of each of the plate-like members 21 are hooks 23 and 24. When the shells are relatively small in size, such as 4 to 6 feet in length, the plate-like members 21 may be dimensioned such that the hooks 23 and 24 will rest directly over corresponding cross members on the lifting track of a fork lift tractor. Normally, however, the shells have much greater length and therefore the hooked plate-like members must be correspondingly greater in length with the hooks 23 and 24 spaced apart further on each member 21 than would make them useful for resting on the cross members of the lifting track of a fork lift tractor. Moreover, the larger the dimensions of the shell, the more working room and clearance is required to mount the shell containing the concrete on the lifting track of a fork lift tractor. Accordingly, for moving shells of the more usual dimensions, such as 8 to 10 feet in length, an auxiliary supporting jig 25 is provided, the features of which are described below.

Returning to elements of construction of the shell 11, with reference to FIGS. 4 and 5, a convenient form of hinge 15 is the combination of a raised edge or a rod 26, a pair of ears 27 and a hinge arm 28 each being affixed to the larger, normally stationary sector 12. It will be noted that arms 28 externally bridge adjacent sectors 12 and 13, and sectors 12 and 14. By this construction the sectors 13 and 14 may be freely pivoted outwardly without portions of hinges 15 touching the concrete and the hinges 15 will have sufficient strength to hold the sectors in a closed position.

A convenient form of locking device 16 is shown in FIG. 5. With reference thereto, a latch arm 29 is pivoted at 31 on one support member 32, which support member mates at adjoining edges with a second support member 33. A toggle arm 34 is pivoted at the other end of latch arm 29 so as to catch support member 33 in a notch, thereby locking sectors 13 and 14 in a closed position. When the arm 34 is pivoted counterclockwise in the view of FIG. 5, it will be apparent that the latch will open.

An embodiment of auxiliary supporting jig 25 is shown in FIG. 6. In one form, the jig comprises a pair of plate-like members 35 spaced apart approximately parallel by rods 36 and 37. As indicated schematically in FIG. 3, the upper and lower rods 36 are positioned to be received under hooks 23 and 24 of the shell. Rod 37 is provided primarily for reinforcement On the opposing edges of each of the plate-like members 35 are a pair of hooked extensions 38 and 39 which, as shown, are adapted to rest over the upper edges of the cross members 41 and 42 on the lifting track of an elevator 42 of a fork lift tractor 44. It will be evident that the number of rods 36 and their relative spacing on the supporting jig 25 may be such as to provide adaptability of the jig to the lifting and transportation of shells of different dimensions, using the same jig. For example, rods intermediate to the positions of rods 36 may be provided so that when shells having hooks 23 and 24 spaced more closely together are to be transported, such immediately positioned rods will support such shells.

In operation, the supporting jig 25 is positioned on the cross members 41 and 42 of a fork lift tractor, and the empty shell 11 is positioned on the rods 36 of the jig. The shell is then lifted and transported to a concrete filling station where a core, if concrete pipe is to be manufactured, is inserted into the shell as it rests on a platform, and the concrete is poured into the shell and consolidated by any suitable means. The shell may be maintained in a fixed position on the fork lift tractor during this step, or the tractor may be moved into position and the shell then again affixed on the cross members of the lifting track. After filling and consolidating, the core is normally immediately removed and the filled shell is then elevated by the fork lift tractor and transported to a curing or storage area. The filled shell is lowered and the sectors 13 and 14 are opened. The fork lift tractor then lifts the shell away from the concrete column and again returns the empty shell to the concrete filling station.

Accordingly, by virtue of the structure of the shell alone or with the supporting jig, it will be evident that several fork lift tractors may quickly position and transport a large number of concrete columns with a minimum of supervision and manual control, thereby greatly increasing the efficiency and economy of the manufacturing process.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetweent.

What is claimed is:

1. Apparatus for molding concrete columns, including an elongated shell, said shell comprising one sector and a pair of longitudinal sectors hingedly mounted thereto, said pair of sectors being adapted to swing be-
between closed positions and open positions for removal of a finished concrete column from said shell; means for temporarily locking said pair of sectors in said closed positions; and

a plurality of hooked members fixedly mounted on the periphery of said one sector and adapted for cooperation with an external lifting force to transport said shell between concrete column processing stations, said hooked members comprising a pair of elongated plate-like members spaced apart longitudinally on said shell, each said plate-like member having a pair of hooks integral with said plate-like member, the hooks in each pair being spaced apart on said plate-like members, said hooks projecting outwardly from the periphery of said shell whereby said shell and a column therein are supported at a plurality of points along their lengths so as to be stabilized during said transport.

2. Apparatus for molding concrete columns, including an elongated shell, said shell having a pair of hingely mounted longitudinal sectors, said sectors being adapted to swing between a closed position and an open position for removal of a finished concrete column from said shell;

means for temporarily locking said sectors in said closed position;

a plurality of hooked members mounted on the periphery of said shell and adapted for cooperation with an external lifting force to transport said shell between concrete column processing stations, said hooked members comprising a pair of plate-like members spaced apart longitudinally on said shell, each said plate-like member having a pair of hooks projecting outwardly from the periphery of said shell; and

a supporting jig separate from said shell, said jig being adapted on one side thereof to receive said hooked members, and adapted on the opposite side thereof to be supported on the cross members of the lifting track of a fork lift tractor.

3. Apparatus as in claim 2 wherein said hooked members comprise a pair of plate-like members spaced apart longitudinally on said shell, each said plate-like member having a pair of hooks projecting outwardly from the periphery of said shell.

4. Apparatus for molding concrete columns, including an elongated shell, said shell having a pair of hingely mounted longitudinal sectors, said sectors being adapted to swing between a closed position and an open position for removal of a finished concrete column from said shell;

means for temporarily locking said sectors in said closed position;

a plurality of hooked members mounted on the periphery of said shell and adapted for cooperation with an external lifting force to transport said shell between concrete column processing stations; and

a supporting jig separate from said shell, said jig being adapted on one side thereof to receive said hooked members, and adapted on the opposing side thereof to be supported on the cross members of the lifting track of a fork lift tractor, said supporting jig comprising a pair of plate-like members transversely connected by a plurality of rod-like members, at least some of said rod-like members being adapted to receive said hooked members thereon to support said shell on said jig, said supporting jig further including a plurality of hooked extensions on each of said plate-like members, said hooked extensions being adapted to rest on said cross members of said lifting track.

5. Apparatus as in claim 1 further including a supporting jig separate from said shell, said jig being adapted on one side thereof to receive said hooked members, and adapted on the opposing side thereof to be supported on the cross members of the lifting track of a fork lift tractor.