Formwork for producing concrete tubbing in a tunnel lining system

The invention relates to formwork for producing concrete tubbing for a tunnel lining system, having a concrete tray for receiving a quantity of concrete required for producing the tubbing and, if required, for receiving the envisaged reinforcement of the concrete tubbing, wherein the concrete tray has at least one base and ~~on the base~~ lateral walls adapted to the base ~~the shape~~, wherein at least one wall is disposed so as to be releasable from the base and pivotable between a closed position and an opened position in relation to the base.

In order for concrete tubbing to be produced, the individual operating steps for producing a concrete tubbing are carried out manually. Besides the operating costs arising here, the work to be carried out is monotonous and stressful to the operators. Furthermore, the activities are carried out using heavy objects such that there is a risk of injury. Despite the repetitive activities, it is at the same time necessary for the works to be carried out with very high precision.

This relates in particular to the use of the formwork units. The latter have to be partially or completely opened or closed at different workstations of the production line. This takes place manually here and is therefore intensive in terms of labor and time. Furthermore, a significant degree of care has to be taken when closing in order for the formwork units to be tight and the concrete introduced while concreting not to leak.

It is therefore an object of the invention to alleviate at least some aspects of the aforementioned issues.

The object is achieved in that the formwork has at least one drive system for pivoting the at least one wall between the open and the closed position and for retaining said wall in the respective position, and that the drive system has at least one actuator for pivoting the at least one wall between the open and the closed position.

As a result thereof it is possible for the opening and closing to be simplified in a simple manner and to ensure at the same time that the position is retained in a simple manner, so that the formwork remains securely closed.

Patent claims

1. A formwork (10) for producing concrete tubbing (500) for a tunnel lining system, having a concrete tray for receiving a quantity of concrete required for producing the tubbing and, if required, for receiving the envisaged reinforcement of the concrete tubbing (500),

wherein the concrete tray has at least one base (12) and ~~on the base~~ lateral walls (14, 15) adapted to the ~~shape~~ base (12), wherein at least one wall is disposed so as to be releasable from the base and pivotable between a closed position and an opened position in relation to the base,

characterized in that the formwork (10) has at least one drive system for pivoting the at least one wall between the open position and the closed position and for retaining said wall in the respective position, and in that the drive system has at least one actuator for pivoting the at least one wall between the open position and the closed position~~.~~;

wherein the drive system is a hydraulic system having at least one hydraulic circuit, wherein the drive system as an actuator (35) has at least one hydraulic cylinder which is connected to the hydraulic circuit;

wherein at least one cover element is provided so as to be pivotable on the formwork (10), said cover element being able to be disposed on the upper side of the concrete tray and on the latter at least partially covering the upper side;

wherein the cover element by at least one actuator (35) is pivotable between an open position and a closed position, said actuator preferably retaining the cover element in the respective position;

wherein the respective actuator (35) is connected to the drive system.

2. The formwork (10) as claimed in claim 1, ~~characterized in that~~ wherein in the closed position at least two walls (14, 15) at one of ~~the~~ two external end regions thereof contact one another by way of the short sides of said walls and herein form a corner (46) of the concrete tub.

3. The formwork (10) as claimed in claim 2, ~~characterized in that~~ wherein a male engagement element (44) is provided in the external end region on one of the two walls, and a female engagement element (45) is provided in the external end region on the other wall, said engagement elements in the closed position of the two walls engaging in one another.

4. The formwork (10) as claimed in claim 2, ~~characterized in that~~ wherein the two walls in the external end regions thereof are connected to one another by means of at least one screw connection (18) or one clamping connection, wherein the screw connection (18) or clamping connection preferably serves for securing the position, and/or wherein the screw connection (18) has a screw (19) having a spring element (23) which is disposed along at least part of the screw (19).

5. The formwork (10) as claimed in one of claims 1 to 4, ~~characterized in that~~ wherein the at least one wall for moving between the open position and the closed position is connected to at least two actuators of the drive system.

6. The formwork (10) as claimed in one of claims 1 to 5, ~~characterized in that~~ wherein at least one wall ~~element~~ has two external end regions, and in that at least one actuator for moving and retaining the wall ~~element~~ is provided per end region.

7. The formwork (10) as claimed in one of claims 1 to 6, ~~characterized in that~~ wherein the drive system at a workstation ~~for driving the drive system~~ is able to be connected to an external drive.

~~8. The formwork as claimed in one of claims 1 to 7, characterized in that the drive system is a hydraulic system having at least one hydraulic circuit, wherein the drive system as an actuator has at least one hydraulic cylinder which is connected to the hydraulic circuit.~~

8. ~~9.~~ The formwork (10) as claimed in claim 1 ~~8~~, ~~characterized in that~~ wherein the hydraulic circuit has a blocking element (60) for maintaining the pressure in the hydraulic circuit, wherein said blocking element (60) is preferably a load-bearing valve.

9. ~~10.~~ The formwork (10) as claimed in claim 8 ~~or 9~~, ~~characterized in that~~ wherein the hydraulic circuit has an element for equalizing a variation in terms of pressure and/or a variation in terms of volume in the hydraulic circuit, wherein said element is preferably a dummy cylinder or a diaphragm accumulator.

10. ~~11.~~ The formwork (10) as claimed in one of clams 8 to 9 as appended to claim 7 ~~10~~, ~~characterized in that~~ wherein the hydraulic circuit has at least one connector element for releasably connecting the hydraulic circuit to a hydraulic apparatus as the external drive of the drive system at a workstation.

11. ~~12.~~ The formwork (10) as claimed in one of claims 1 to 7, ~~characterized in that~~ wherein the drive system as an actuator is a mechanical drive, preferably a spindle drive.

12. ~~13.~~ The formwork (10) as claimed in claim 11 ~~12~~, ~~characterized in that~~ wherein the mechanical drive is conceived so as to be self-locking, or is provided with a blocking element.

13. ~~14.~~ The formwork (10) as claimed in claim 11 or 12 ~~12 or 13~~, ~~characterized in that~~ wherein the mechanical drive has a connecting element for releasably connecting to an external rotational drive, for example a torque driver, as the external drive of the drive system at a workstation.

~~15. The formwork as claimed in one of claims 1 to 14, characterized in that at least one cover element is provided so as to be pivotable on the formwork, said cover element being able to be disposed on the upper side of the concrete tray and on the latter at least partially covering the upper side.~~

~~16. The formwork as claimed in claim 15, characterized in that the cover element by at least one actuator is pivotable between an open position and a closed position, said actuator preferably retaining the cover element in the respective position.~~

14. ~~17.~~ The formwork (10) as claimed in claim 1 ~~15 or 16,~~ ~~characterized in that~~ wherein the cover element has an arrestor element which arrests the cover element in the closed position in relation to the formwork.

15. ~~18.~~ The formwork (10) as claimed in claim 14 ~~17~~, ~~characterized in that~~ wherein the arrestor element by at least one actuator is pivotable between an open position and a closed position.

16. ~~19.~~ The formwork (10) as claimed in claim 4, ~~characterized in that~~ wherein the clamping connection has an arrestor element which is disposed on one of the wall elements and by at least one actuator is pivotable between an open position and a closed position.

~~20. The formwork as claimed in one of claims 16 to 19, characterized in that the respective actuator is connected to the drive system as claimed in one of clams 8 to 14.~~

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