shortened construction time, as well as achieve the targets of upgraded construction quality and transparent data processing.

SUMMARY OF THE INVENTION

Embodiments~~A primary object~~ of the present invention seek~~is~~ to provide a system for precise vertical centering and positioning of a steel plunge column in a round or a rectangular foundation pile hole in a top-down construction during column hoisting and positioning process and concrete pouring process at different phases thereof.

Embodiments~~Another object~~ of the present invention also seek~~is~~ to provide a system that includes hydraulic adjustment units, which not only enable precise vertical centering and positioning of a steel plunge column in the top-down construction, but also provide earth-retaining function in a foundation pile hole.

Embodiments~~A further object~~ of the present invention further seek~~is~~ to provide a system that includes an electronic inclinometer and a computerized digital positioning monitoring system to enables precise and real-time observation, measurement and adjustment of the vertical accuracy and displacement of a steel plunge column positioned in a foundation pile hole according to the top-down construction.

According to an aspect of the present invention, there is provided a system for vertical centering and positioning of steel plunge column in top-down construction method being applied to piling operation in a rectangular foundation pile hole, comprising a plurality of hydraulic adjustment units, a plurality of pile hole wall supporting and retaining pipes, a two-way electronic inclinometer, and a computerized digital positioning monitoring system; the hydraulic adjustment units being spaced from one another in a space between the rectangular foundation pile hole and a steel plunge column positioned in the rectangular foundation pile hole, and having an earth-retaining function; wherein each of the hydraulic adjustment units includes: a base in the form of a long plate being connected on an outer side to at least one of the pile hole wall supporting and retaining pipes; at least one push plate for closely contacting with an outer surface of the steel plunge column; at least one hydraulic-actuated extendable supporting arm having an end pivotally connected to a lateral side of the base and an opposite extendable end pivotally connected to an end of one corresponding push plate; and at least one set of parallelly spaced pivoted arms respectively having a proximal end pivotally connected to a lateral side of the base and a distal end pivotally connected to a lateral side of one corresponding push plate; whereby when the hydraulic-actuated extendable supporting

arm is actuated to extend the extendable end thereof, the push plate is moved to push against the outer surface of the steel plunge column while the pivoted arms are moved into an extended position between the base and the push plate, and on the other hand, when the hydraulic-actuated extendable supporting arm is actuated to draw back the extendable end thereof, the push plate is moved away from the outer surface of the steel plunge column while the pivoted arms are moved into a folded position between the base and the push plate, so that the steel plunge column can be adjusted or corrected in position to align with a column centerline in the foundation pile hole and an effective vertical positioning of the steel plunge column in the foundation pile hole during column hoisting and positioning process in the top-down construction can be achieved with the hydraulic adjustment units.

A~~To achieve the above and other objects, the~~ system for vertical centering and positioning steel plunge column in top-down construction method according to an ~~preferred~~ embodiment of the present invention includes a plurality of hydraulic adjustment units, a plurality of pile hole wall supporting and retaining pipes, a two-way electronic inclinometer, and a computerized digital positioning monitoring system. The hydraulic adjustment units are spaced around a steel plunge column