Before inserting the new roller cutter into its housing, it must be properly positioned, which requires a painstaking manual intervention.

Once the roller cutter is pushed toward its operating position, several blocking wedges are put in place, which are held by means of bolts.

It will be understood that this procedure is long and tedious for the operators.

Embodiments~~One object~~ of the present invention seek to~~is therefore~~ to implement a method for replacing a roller cutter which makes it possible to reduce, or even to eliminate, any human intervention during the replacement of a roller cutter.

Embodiments~~Another object~~ of the invention also seek~~is~~ to provide~~propose~~ a roller cutter which lends itself to such a method.

Embodiments~~Another object~~ of the invention also seek~~is~~ to obtain a roller cutter handling device suited to the implementation of this method, by making it possible in particular to avoid any loss of components.

Likewise, the roller cutter handling device may~~must~~ be easy to clean and not include any areas that retain water or mud.

Finally, this device may~~must~~ be usable in existing cutting heads without requiring modifications to the same.

BRIEF DESCRIPTION OF THE INVENTION

According to an aspect of the invention, a method for replacing a roller cutter mounted with preloading within~~inside~~ a housing built~~incorporated~~ into the cutting head of a tunnel boring machine is provided~~proposed~~, the method being implemented with a roller cutter ~~permanently~~ bearing, permanently attached thereto, a member for locking it within~~into~~ the housing and means for applying said preloading.

Said method comprises the steps consisting of:

a) removal of a used roller cutter from said housing, comprising the following steps:

- clamping onto the housing of a handling device designed for grasping and guiding the roller cutter,

- grasping of the roller cutter by the handling device,

- release~~ing~~ of the preload~~ing~~ applied to the roller cutter,

- unlocking the roller cutter from the housing,

- extraction~~ng~~ of the roller cutter from the housing,

- unclamping the handling device from the housing,

b) installation in said housing of a replacement roller cutter, comprising the following steps:

- grasping of the roller cutter by the handling device,

• docking, then clamping of the roller cutter handling device ~~on~~to the housing,

• insertion of the roller cutter into the housing, said roller cutter being guided by the handling device,

• locking ~~of~~ the roller cutter into the housing,

• applying~~ication of~~ a preload~~ing~~ to the roller cutter.

With particular advantage, said method may be~~is~~ implemented in an automated fashion using a mechanized system equipping the roller cutter handling device.

For implementing this method, the roller cutter permanently bears the elements that allow it to be locked and put under preload in the housing.

This can avoid~~s~~ any loss of components during handling, dismantling and remounting of the roller cutter.

According to a preferred embodiment of the method, the roller cutter is held by the handling device through its locking member.

There is also disclosed~~A second object of the invention is therefore~~ a roller cutter designed for implementing said replacement method.

The locking member of said roller cutter is designed to be immobilized, so that the roller cutter constitutes a rigid block for the purpose of its handling.

According to a particular embodiment of the invention, the locking member includes a bayonet that is movable in rotation between a position for insertion of the roller cutter into the housing and a position for locking the roller cutter within the housing.

The means for preloading the roller cutter can include screws which are permanently born by the roller cutter.

Thus, said preloading screws are preferably carried by the bayonet in a way that may precludes loss.

There is also disclosed~~A third object of the invention is~~ a device for handling the roller cutter in implementing said method for replacing a roller cutter.

More precisely, this handling device comprises:

- an element for clamping onto the housing,
- an element for grasping the roller cutter,
- means for releasing or applying preload~~ing~~ to the roller cutter,
- an element for extracting the roller cutter,
- a member for actuating the locking member of the roller cutter.

Advantageously, said device also includes means for cleaning the housing.

Further, said device preferably includes means of transporting, docking and/or clamping onto the housing by means of a robot.

There is also disclosed~~A fourth object of the invention is~~ a tunnel boring machine including a cutting head and a plurality of roller cutters such as those described above and housings built into the cutting head, said housings bearing contact surfaces for locking the roller cutters.

Said housing advantageously have contact surfaces for docking and guiding a roller cutter handling device such as that described above.

Finally, the roller cutters and the housings advantageously have respective complementary supporting contact surfaces for centering and guiding the roller cutter within the housing.

BRIEF DESCRIPTION OF DRAWINGS

Other features and advantages of the invention will appear from the detailed description that will follow, with reference to the appended drawings in which:

Figure 1A shows a roller cutter inside a housing and a device for guiding the roller cutter in a roller cutter change situation,

Figures 1B through 1F illustrate the different steps in the process of mounting a roller cutter conforming to the invention,