CLAIMS

1. An excavation machine (10) comprising:

· a mast (14) having a longitudinal direction;

· a bar (18) presenting a first end (14a) provided with an excavation tool (20); and

· a carriage (16) movable along the longitudinal direction of the mast and including a first holder member (26) for holding the bar relative to the carriage, said carriage being suitable for moving the bar along the longitudinal direction of the mast, the first holder member (26) being pivotable relative to the carriage (16), and the first holder member (26) presenting a locked state in which the bar is prevented from moving in translation relative to the carriage (16), and an unlocked state in which the bar is free to move in translation relative to the carriage, said machine being characterized in that the mast (14) presents a first end (14a) that carries a second holder member (42) suitable for receiving and holding the bar (18) relative to the mast, said second holder member presenting a locked state in which the bar is prevented from moving relative to the mast, and an unlocked state in which the bar is free to move relative to the mast.

2. An excavation machine according to claim 1, characterized in that the bar (18) is suitable for sliding in the second holder member (42) when it is in its unlocked position.

3. An excavation machine according to claim 1 or claim 2, characterized in that the first holder member (26) is suitable for pivoting about a pivot axis (A) that is orthogonal to the longitudinal direction of the mast (14).

4. An excavation machine according to claim 3, characterized in that the pivot axis (A) is orthogonal to an excavation plane (P).

5. An excavation machine according to any one of claims 1 to 4, characterized in that the bar (18) is suitable for sliding in the first holder member (26) when it is in its unlocked position.

6. An excavation machine according to any one of claims 1 to 5, characterized in that the excavation tool (20) includes at least one hydraulic motor (22, 24) and in that the machine further includes at least one first hydraulic pipe (50) connecting the carriage and the hydraulic motor via a second end (18b) of the bar (18) opposite from the first end (18a), while passing via the inside of the bar, and at least one second hydraulic pipe (56) connecting the carriage (16) and a hydraulic coupling (58) located substantially halfway along the mast, said coupling being designed to be connected to a hydraulic power source for powering the hydraulic motor (22, 24).

7. An excavation machine according to any one of claims 1 to 6, characterized in that the excavation tool (20) is a soil-mixing cutter (20a, 20b).

8. A method of raising a bar (18) of an excavation machine (10) according to any one of claims 1 to 7, said bar (18) presenting a length that is substantially longer than the length of the mast (14), in which method, starting from a position in which the bar is substantially perpendicular to the mast, with the excavation tool resting on the ground, the bar is moved into a position substantially parallel with the mast by moving the excavation machine towards the excavation tool

(20), the excavation tool remaining stationary, while the first holder member is in the unlocked state.

9. A method of raising a bar (18) according to claim 8, said method being characterized in that it further includes a step during which the first end (18a) of the bar (18) is engaged in the second holder member (42) after the carriage has reached the second end (14b) of the mast (14).

10. A method of raising a bar (18) of an excavation machine (10) according to any one of claims 1 to 7, said bar presenting a length that is substantially longer than the length of the mast (14), in which method, starting from a position in which the bar is practically perpendicular to the mast, the bar (18) is brought into a position substantially parallel to the mast by moving the carriage from a first end of the mast towards a second end of the mast opposite from the first end, the bar being prevented from moving relative to the first holder member (26), said method being characterized in that it further includes a step during which the first end (18a) of the bar (18) is engaged in the second holder member (42) after the carriage has reached the second end (14b) of the mast (14).

11. A raising method according to claim 10, in which the first holder member (26) is in the locked state during the movement of the carriage (16).

12. An excavation method in which an excavation machine (10) according to any one of claims 1 to 7 is provided, said machine including a bar (18) that is substantially longer than the mast, said method comprising the following successive steps:

· a raising step during which the bar is brought into a position substantially parallel with the mast (14);

· a positioning step in which the carriage (16) is positioned at the second end (14b) of the mast (14);

· a first sinking step of sinking the excavation tool into the ground, during which the first holder member (26) is locked if it is not already locked, and the carriage (16) while locked to the bar is moved towards the first end of the mast so as to bring the excavation tool (20) into a first sunk position (P1);

· a positioning step in which the carriage (16) is positioned at the second end of the mast, or else at a height along the mast (14) corresponding to the second end (18b) of the bar (18) if the second end is at a height less than the length of the mast (14), after the first holder member has been put into the unlocked state, the excavation tool remaining in its first sunk position; and

· a second sinking step of sinking the excavation tool (20), this step being analogous to the first sinking step, so as to bring the excavation tool into a second sunk position (P2), said method being characterized in that the first end (18a) of the bar (18) is engaged in the second holder member (42) at the end of the raising step, in that during the first sinking step, the second holder member (42) is in the unlocked state, and in that, at the end of the first sinking step, a locking step is performed of locking the second holder member (42) so as to prevent the bar (18) from moving relative to the mast (14).

CLAIMS

1. An excavation machine comprising:

a mast having a longitudinal direction;

a kelly bar presenting a first end provided with an excavation tool, the excavation tool comprising two rotary tools designed to turn about parallel horizontal axes during excavation operations; and

a carriage movable along the longitudinal direction of the mast and including a first holder member for holding the bar relative to the carriage, said carriage being suitable for moving the bar along the longitudinal direction of the mast, wherein the first holder member is pivotable relative to the carriage, and wherein the first holder member presents a locked state in which the bar is prevented from moving in translation relative to the carriage, and an unlocked state in which the bar is free to move in translation relative to the carriage, wherein the mast presents a first end that carries a second holder member suitable for receiving and holding the bar relative to the mast, said second holder member presenting a locked state in translation in which the bar is prevented from moving relative to the mast, and an unlocked state in which the bar is free to move relative to the mast by sliding in the second holder member.

2. The excavation machine according to claim 1, wherein the first holder member is suitable for pivoting about a pivot axis that is orthogonal to the longitudinal direction of the mast.

3. The excavation machine according to claim 2, wherein the pivot axis is orthogonal to an excavation plane.

4. The excavation machine according to claim 1, wherein the bar is suitable for sliding in the first holder member when it is in its unlocked position.

5. The excavation machine according to claim 1, wherein the excavation tool includes at least one hydraulic motor, and wherein the machine further includes at least one first hydraulic pipe connecting the carriage and the hydraulic motor via a second end of the bar opposite from the first end, said first hydraulic pipe passing via the inside of the bar, and at least one second hydraulic pipe connecting the carriage and a hydraulic coupling located substantially halfway along the mast, said coupling being designed to be connected to a hydraulic power source for powering the hydraulic motor.

6. The excavation machine according to claim 1, wherein the excavation tool is a soil-mixing cutter.

7. The method of raising a bar of an excavation machine according to claim 1, said bar presenting a length that is substantially longer than the length of the mast, in which method, starting from a position in which the bar is practically perpendicular to the mast, the bar is brought into a position substantially parallel to the mast by moving the carriage from a first end of the mast towards a second end of the mast opposite from the first end, the bar being prevented from moving relative to the first holder member, wherein said method further includes a step during which the first end of the bar is engaged in the second holder member after the carriage has reached the second end of the mast.

8. The method of raising a bar according to claim 7, in which the first holder member is in the locked state during the movement of the carriage.

9. The excavation machine according to claim 1, wherein the second holder member includes fingers for co-operating with orifices that are formed along the longitudinal edges of the bar so as to enable the bar to be prevented from moving relative to the mast.

10. The excavation machine according to claim 1, wherein the excavation tool is a soil mixing cutter.

11. A method of raising a bar of an excavation machine, the excavation machine comprising: a mast having a longitudinal direction; a bar presenting a first end provided with an excavation tool; and a carriage movable along the longitudinal direction of the mast and including a first holder member for holding the bar relative to the carriage, said carriage being suitable for moving the bar along the longitudinal direction of the mast, wherein the first holder member is pivotable relative to the carriage, and wherein the first holder member presents a locked state in which the bar is prevented from moving in translation relative to the carriage, and an unlocked state in which the bar is free to move in translation relative to the carriage, wherein the mast presents a first end that carries a second holder member suitable for receiving and holding the bar relative to the mast, said second holder member presenting a locked state in which the bar is prevented from moving relative to the mast, and an unlocked state in which the bar is free to move relative to the mast,

said bar presenting a length that is substantially longer than the length of the mast, in which the method comprises the step of, when starting from a position in which the bar is substantially perpendicular to the mast, with the excavation tool resting on the ground, the bar is

moved moving the bar into a position substantially parallel with the mast by moving the excavation machine towards the excavation tool, the excavation tool remaining stationary, while the first holder member is in the unlocked state.

12. The method of raising a bar according to claim 11, wherein said method further includes a step during which the first end of the bar is engaged in the second holder member after the carriage has reached the second end of the mast.

13. An excavation method in which the excavation machine according to claim 1 is provided, said machine including a bar that is substantially longer than the mast, said method comprising the following successive steps:

a raising step during which the bar is brought into a position substantially parallel with the mast;

a positioning step in which the carriage is positioned at the second end of the mast;

a first sinking step of sinking the excavation tool into the ground, during which the first holder member is locked if it is not already locked, and the carriage while locked to the bar is moved towards the first end of the mast so as to bring the excavation tool into a first sunk position;

a positioning step in which the carriage is positioned at the second end of the mast, or else at a height along the mast corresponding to the second end of the bar if the second end is at a height less than the length of the mast, after the first holder member has been put into the unlocked state, the excavation tool remaining in its first sunk position; and

a second sinking step of sinking the excavation tool, this step being analogous to the first sinking step, so as to bring the excavation tool into a second sunk position,

wherein the first end of the bar is engaged in the second holder member at the end of the raising step, wherein during the first sinking step, the second holder member is in the unlocked state, and wherein, at the end of the first sinking step, a locking step is performed of locking the second holder member so as to prevent the bar from moving relative to the mast.

14. An excavation machine comprising:

a mast having a longitudinal direction;

a kelly bar presenting a first end provided with an excavation tool, the excavation tool comprising two rotary tools designed to turn about parallel horizontal axes during excavation operations; and

a carriage movable along the longitudinal direction of the mast and including a first holder member for holding the bar relative to the carriage, said carriage being suitable for moving the bar along the longitudinal direction of the mast, wherein the first holder member is pivotable relative to the carriage, and wherein the first holder member presents a locked state in which the bar is prevented from moving in translation relative to the carriage, and an unlocked state in which the bar is free to move in translation relative to the carriage, wherein the mast presents a first end that carries a second holder member suitable for receiving and holding the bar relative to the mast, said second holder member presenting a locked state in translation in which the bar is prevented from moving relative to the mast, and an unlocked state in which the bar is free to move relative to the mast by sliding in the second holder member,

wherein the first holder member is suitable for pivoting about a pivot axis that is orthogonal to the longitudinal direction of the mast, and

wherein said bar presenting a length that is substantially longer than the length of the mast.

15. An excavation machine comprising:

a mast having a longitudinal direction;

a kelly bar presenting a first end provided with an excavation tool, the excavation tool comprising two rotary tools designed to turn about parallel horizontal axes during excavation operations; and

a carriage movable along the longitudinal direction of the mast and including a first holder member for holding the bar relative to the carriage, said carriage being suitable for moving the bar along the longitudinal direction of the mast, wherein the first holder member is pivotable relative to the carriage, and wherein the first holder member presents a locked state in which the bar is prevented from moving in translation relative to the carriage, and an unlocked state in which the bar is free to move in translation relative to the carriage, wherein the mast presents a first end that carries a second holder member suitable for receiving and holding the bar relative to the mast, said second holder member presenting a locked state in translation in which the bar is prevented from moving relative to the mast, and an unlocked state in which the bar is free to move relative to the mast by sliding in the second holder member,

wherein the first holder member is suitable for pivoting about a pivot axis that is orthogonal to the longitudinal direction of the mast, and

wherein the pivot axis is orthogonal to an excavation plane.