CLAIMS

1. A boring machine (10, 300) for making a trench (T) in soil (S), the machine comprising a frame (12, 312) extending along a longitudinal direction (A), said frame (12, 312) having a bottom end (12a, 312a), the boring machine having a boring device (20, 320) mounted at the bottom end (12a, 312a) of the frame (12, 312), the boring device (20, 320) comprising:

- a first boring member (30) that is rotatable about a first axis of rotation (X1), the first axis of rotation (X1) being transverse to the longitudinal direction (A) of the frame (12);

- a first motor (32) configured to drive rotation of the first boring member (30) about the first axis of rotation (X1);

- a second boring member (50) rotatable about a second axis of rotation (X2), the second axis of rotation (X2) being stationary relative to the first axis of rotation (X1);

- a second motor (52) configured to drive the second boring member in rotation about the second axis of rotation (X2);

- a third boring member (60) rotatable about a third axis of rotation (X3), the third axis of rotation (X3) being spaced apart from and parallel to the first axis of rotation (X1);

- a third motor (62) configured to drive the third boring member (60) in rotation about the third axis of rotation (X3);

- a fourth boring member (70) that is rotatable about a fourth axis of rotation (X4), the fourth axis of rotation being stationary relative to the first, second, and third axes of rotation (X1, X2, X3);

- a fourth motor (74) configured to drive the fourth boring member (70) in rotation about the fourth axis of rotation (74), the first, second, third, and fourth axes of rotation (X1, X2, X3, and X4) lying substantially in a

common plane (Q) that is transverse to the longitudinal direction of the frame; and

- a support (40) that is mounted at the bottom end of the frame and that carries the first, second, third, and fourth boring members (30, 50, 60, and 70), together with the first, second, third, and fourth motors (32, 52, 62, and 72).

2. A boring machine according to claim 1, characterized in that the second boring member (50) is suitable for rotating relative to the first boring member (30).

3. A boring machine according to claim 1 or claim 2, characterized in that the fourth boring member (70) is suitable for rotating relative to the third boring member (60).

4. A boring machine according to any one of claims 1 to 3, wherein the support comprises a plate (41) to which the first, second, third, and fourth boring members and the first, second, third, and fourth motors are mounted.

5. A boring machine according to any preceding claim, wherein the first, second, third, and fourth motors (32, 52, 62, and 72) are housed respectively in the first, second, third, and fourth boring members (30, 50, 60, and 70).

6. A boring machine according to any preceding claims, wherein the first, second, third, and fourth boring members comprise respectively first, second, third, and fourth pairs of drums (34, 54, 64, and 74), the first, second, third, and fourth pairs of drums being provided respectively with first, second, third, and fourth series of cutter teeth (36, 56, 66, and 76).

7. A boring machine according to any preceding claim, wherein the first and second axes of rotation (X1, X2) are colinear, and the third and fourth axes of rotation (X3, X4) are colinear.

8. A boring machine according to any one of claims 1 to 7, wherein the diameters (D3, D4) of the second and fourth boring members (50 and 70) are greater than the diameters (D1, D3) of the first and third boring members (30 and 60).

9. A boring machine according to claim 8, wherein the distance between the second and fourth axes of rotation (X2, X4) is greater than the distance between the first and third axes of rotation (X1, X3).

10. A boring machine according to claim 6 and claim 8 or claim 9, wherein the radial heights of the teeth of the second and fourth series of teeth are greater than the radial heights of the teeth of the first and third series of teeth.

11. A boring machine according to any preceding claim, wherein the first boring member (30) comprises first and second drums (34a and 34b), while the second boring member (50) comprises third and fourth drums (54a, 54b), and wherein the minimum distance (d) between the second and third drums (34b and 54a) considered in a direction parallel to the first axis of rotation is less than 5 cm.

12. A boring machine according to any preceding claim, characterized in that it further comprises a control member (100) for controlling the first, second, third, and fourth motors independently of one another.

13. A boring machine according to claim 12, characterized in that the control member (100) is configured to control

the speeds of rotation and/or the directions of rotation of the first, second, third, and fourth motors (32, 52, 62, and 72) independently of one another.

14. A boring machine according to claim 12 or claim 13, characterized in that the first, second, third, and fourth motors (32, 52, 62, and 72) are hydraulic, and in that the control member (100) is configured to adjust the hydraulic power delivered to each of the first, second, third, and fourth motors.

15. A boring machine according to claim 14, characterized in that it further comprises at least a first hydraulic circuit (110, 1100), the first hydraulic circuit comprising:

- a first main hydraulic pump (112, 1120); and
- a first distribution member (114, 1140) connected to the first main hydraulic pump, the first distribution member (114, 1140) powering a first group of two motors (32, 52) selected from the first, second, third, and fourth motors.

16. A boring machine according to claim 15, characterized in that the boring device (20, 20') includes the first distribution member (114, 1140).

17. A boring machine according to claim 15 or claim 16, wherein the first distribution member (114) comprises:

- a first main hydraulic motor (116) powered by the first main hydraulic pump (112);
- a first secondary hydraulic pump (118) actuated by said first main hydraulic motor (116), the first secondary hydraulic pump (118) powering one of the two motors of the first group; and
- a second secondary hydraulic pump (120) actuated by said first main hydraulic motor (116), the second

secondary hydraulic pump (120) powering the other one of the two motors of the first group.

18. A boring machine according to claim 15 or claim 16, wherein the first distribution member (1140) comprises a first hydraulic junction (1150) connected to the first main hydraulic pump (1120) and to at least one of the motors of the first group, and a second hydraulic junction (1170) connected to the first main hydraulic pump (1120) and to at least the other one of the motors of the first group.

19. A boring machine according to any one of claims 15 to 18, characterized in that it further comprises a second hydraulic circuit (130, 1300) comprising:

- a second main hydraulic pump (132, 1320); and
- a second distribution member (134, 1340) connected to the second main hydraulic pump (132, 1320), the second distribution member (134, 1340) powering a second group of two motors (62, 72) taken from among the first, second, third, and fourth motors, the second group being different from the first group.

20. A boring machine according to claim 19, characterized in that the boring device (20) includes the second distribution member (134, 1340).

21. A boring machine according to any preceding claim, characterized in that said boring machine is a cutter (10), and in that the first, second, third, and fourth boring members have cutter teeth (36, 56, 66, and 76).

22. A boring machine according to any one of claims 1 to 20, characterized in that said boring machine is a boring and mixing machine (300), and in that the first, second, third, and fourth boring members comprise mixing tools (333).

23. A boring machine according to claim 22, characterized in that the frame (312) is constituted by a longitudinal bar (313), and in that said machine further comprises a mast (315) and a carriage (317) that is movable along the mast, the carriage being fastened to the longitudinal bar.

24. A method of making a diaphragm wall in soil by using a boring machine according to any preceding claim.

25. A method of making a diaphragm wall according to claim 24, using a boring machine according to any one of claims 8 to 10, the diaphragm wall being circular.