Claims

1. A compaction device, comprising at least one traveling drum (2) rotatable about a drum shaft (1), coupled vibration exciters (30a,30b) generating an oscillation torque about the drum shaft (1), said vibration exciters having unbalanced masses (3) rotating out of phase by 180 degrees in the same direction of rotation, and having a drive shaft (5a,5b) running coaxial to the drum shaft (1) for driving the vibration exciters (30a, 30b),
characterized in that
the drum (2) is divided at least once and that each drum part (2a,2b) comprises at least two coupled vibration exciters (30a,30b) mounted in the drum (2) at a distance from the drum shaft (1).

2. The compaction device according to claim 1, characterized in that the drive shafts (5a,5b) for the vibration exciters (30a,30b) of the individual drum parts (2a,2b) are mechanically coupled or via a control means are adjusted to be in-phase so that the vibration exciters (30a,30b) of all drum parts (2a,2b) oscillate in synchronism also in case of a turning of the drum parts (2a,2b) relative to each other.

3. The compaction device according to claim 1 or 2, characterized in that the drive shafts (5a,5b) for the vibration exciters (30a,30b) of the adjacent drum parts (2a,2b) are mechanically coupled via a transmission (6) and said transmission (6) is operative to transmit the rotation and respectively the drive torque of a drive shaft (5a) with correct phase to the following drive shaft (5b) of the drum part (2a).

4. The compaction device according to claim 3, characterized in that the transmission for coupling the drive shaft parts (5a,5b) is a planetary gear transmission (6) or a spur gear transmission or a bevel gear transmission.

5. The compaction device according to any one of claims 1 to 4, characterized in that the drum (2) is of a two-part design and each drum part (2a,2b) comprises a traveling drive (7a,7b) of its own, the two drum parts (2a,2b) being connected to each other in a manner allowing them to be turned coaxially relative to each other.

6. The compaction device according to claim 4 or 5, characterized in that the planetary gear transmission (6) comprises at least two planetary gear sets (6a,6b).

7. The compaction device according to claim 6, characterized in that the planetary gear transmission (6) comprises two planetary gear sets (6a, 6b) having a common planetary carrier (9), with ring gears (10a,10b) of the planetary gear sets (9) are respectively connected to a drum part (2a,2b) for common rotation therewith, and the respective drive shaft parts (5a,5b) are connected to the respective sun gears (11a, 11b) of the planetary gear sets (6a,6b).

8. The compaction device according to any one of claims 1 to 7, characterized in that the drive shaft part (5a,5b) of each drum part (2a,2b) is operative to drive, via a gear transmission, the at least two vibration exciters (30a,30b).

9. The compaction device according to claim 8, characterized in that the drive for driving the unbalanced masses (3) is a belt transmission or a chain drive.

10. The compaction device according to any one of claims 3 to 9, characterized in that the drive for driving the vibration exciters (30a,30b) is a toothed-belt transmission (15a,15b) comprising a toothed belt for driving toothed-belt pulleys (13) coupled with unbalanced masses (3).

11. The compaction device according to any one of claims 9 or 10, characterized in that the drive is a belt transmission with a belt guiding arrangement allowing for reversal of the direction of circulation and for a reciprocal transmission ratio toward the planetary gear transmission (6).

12. The compaction device according to claim 11, characterized in that the transmission ratio of the belt transmission (15) and the transmission ratio of the planetary gear transmission (6) together result in a transmission ratio of 1:1.

13. The compaction device according to any one of claims 9 to 12, characterized in that a multi-stage planetary gear transmission (6) and a belt transmission without reversal of rotational direction and without reciprocal transmission ratio toward the planetary gear transmission (6) are provided.

14. The compaction device according to any one of claims 10 to 13, characterized in that the vibration exciters (30a,30b) comprise unbalanced masses (3) and said unbalanced masses (3) comprise unbalanced plates (14) being laterally fastened to toothed-belt pulleys (13) of the toothed-belt transmission (15a,15b) and having a radially outward flank (14) which in a predetermined starting position is in alignment with the toothed belt (32) of the toothed-belt transmission (15a,15b) if the rotational angle displacement between the two toothed-belt pulleys (13) driven by the toothed-belt transmission (15a,15b) corresponds to the desired value.

15. The compaction device according to any one of claims 9 to 14, characterized in that a belt tensioning device is operative to tension the belt (32) for driving the unbalanced masses (3) and respectively of the pulleys (13) with the aid of an eccentrically displaceable bearing pin (20a, 20b).

16. The compaction device according to claim 15, characterized in that said belt tensioning device comprises an eccentric adjustment pin (17) for turning said eccentric bearing pin (20a,20b).

17. The compaction device according to any one of claims 9 to 16, characterized in that the belt transmission (15a,15b) comprises pulleys (13) which are coaxial and concentric with the rotational axis of the unbalanced masses (3) and whose weight distribution does not extend with rotational symmetry with respect to the rotational axis of the unbalanced masses (3).

18. The compaction device according to claim 17, characterized in that recesses (35) in the material of the toothed-belt pulley (13), being not symmetrical with the rotational axis of the unbalanced masses (3), effect a non-rotationally symmetric weight distribution and form a negative unbalanced mass.

19. The compaction device according to any one of claims 9 to 18, characterized in that unbalanced plates (14) are fastened to the pulleys (13), and/or asymmetrically arranged screws (18) form an unbalanced mass (3), said screws (18) being also adapted for attachment of the unbalanced plates (14).

20. The compaction device according to any one of claims 1 to 19, characterized in that, for accommodating the rolling bearings (34) of the unbalanced masses (3), cantilevered pivot pins (20a,20b) are provided, said rolling bearings (34) preferably being arranged centrically to the radial belt force and centrifugal force of the unbalanced masses (3).

21. A method for the compacting of ground by means of a drum (2) of a compacting device, where, with the aid of at least one vibration exciter (30a,30b) comprising rotating unbalanced masses (3), compacting vi-

brations of the drum (2) are generated, characterized by the use of a divided drum (2) with two drum halves (2a,2b), in which the unbalanced masses (3) of the vibration exciters (30a,30b) in each part (2a,2b) of the drum (2) are rotated by the same angle with respect to the phase position as in the turning of the drum halves (2a,2b) relative to each other, so that a synchronization of the oscillatory movement of the two drum halves (2a,2b) is obtained even if the drum halves (2a, 2b) have been turned relative to each other.

Claims

1. A compaction device, comprising at least one traveling drum (2) rotatable about a drum shaft (1), coupled vibration exciters (30a; 30b) generating an oscillation torque about the drum shaft (1), said vibration exciters having unbalanced masses (3) rotating out of phase by 180 degrees in the same direction of rotation, and having at least one drive shaft (5a,5b) running coaxial to the drum shaft (1) for driving the vibration exciters (30a; 30b),
characterized in that
the drum (2) is divided at least once and that each drum part (2a,2b) comprises at least two coupled vibration exciters (30a,30b) mounted in the drum (2) at a distance from the drum shaft (1), the vibration exciter (30a) of one drum part (2a) being coupled to the vibration exciter (30b) of another drum part (2b).

2. The compaction device according to claim 1, characterized in that the drive shafts (5a,5b) for the vibration exciters (30a,30b) of the individual drum parts (2a,2b) are mechanically coupled or via a control means are adjusted to be in-phase so that the vibration exciters (30a,30b) of all drum parts (2a,2b) oscillate in synchronism also in case of a turning of the drum parts (2a,2b) relative to each other.

3. The compaction device according to claim 1 or 2, characterized in that the drive shafts (5a,5b) for the vibration exciters (30a,30b) of the adjacent drum parts (2a,2b) are mechanically coupled via a transmission (6) and said transmission (6) is operative to transmit the rotation and respectively the drive torque of a drive shaft (5a) with correct phase to the following drive shaft (5b) of the drum part (2a).

4. The compaction device according to claim 3, characterized in that the transmission for coupling the drive shafts (5a,5b) is a planetary gear transmission (6) or a spur gear transmission or a bevel gear transmission.

5. The compaction device according to any one of claims 1 to 4, characterized in that the drum (2) is of a two-part design and each drum part (2a,2b) comprises a traveling drive (7a,7b) of its own, the two drum parts (2a,2b) being connected to each other in a manner allowing them to be turned coaxially relative to each other.

6. The compaction device according to claim 4 or 5, characterized in that the planetary gear transmission (6) comprises at least two planetary gear sets (6a,6b).

7. The compaction device according to claim 6, characterized in that the planetary gear transmission (6) comprises two planetary gear sets (6a, 6b) having a common planetary carrier (9), with ring gears (10a,10b) of the planetary gear sets (6a,6b) are respectively connected to a drum part (2a,2b) for common rotation therewith, and the respective drive shaft parts (5a,5b) are connected to the respective sun gears (11a, 11b) of the planetary gear sets (6a,6b).

8. The compaction device according to any one of claims 1 to 7, characterized in that the drive shafts (5a,5b) of each drum part (2a,2b) is operative to drive, via a gear transmission, the at least two vibration exciters (30a,30b).

9. The compaction device according to claim 8, characterized in that the drive for driving the unbalanced masses (3) is a belt transmission or a chain drive.

10. The compaction device according to any one of claims 3 to 9, characterized in that the drive for driving the vibration exciters (30a,30b) is a toothed-belt transmission (15a,15b) comprising a toothed belt (32) for driving toothed-belt pulleys (13) coupled with unbalanced masses (3).

11. The compaction device according to any one of claims 9 or 109, characterized in that the drive is a belt transmission with a belt guiding arrangement allowing for reversal of the direction of circulation and for a reciprocal transmission ratio toward the planetary gear transmission (6).

12. The compaction device according to any one of claims 9 to 11, characterized in that a multi-stage planetary gear transmission (6) and a belt transmission without reversal of rotational direction and without reciprocal transmission ratio toward the planetary gear transmission (6) are provided.

13. The compaction device according to any one of claims 10 to 12, characterized in that the vibration exciters (30a,30b) comprise unbalanced masses (3) and said unbalanced masses (3) comprise unbalanced plates (14) being laterally fastened to toothed-belt pulleys (13) of the toothed-belt transmission (15a,15b) and having a radially outward flank (14a) which in a predetermined starting position is in alignment with the toothed belt (32) of the toothed-belt transmission (15a,15b) if the rotational angle displacement between the two toothed-belt pulleys (13) driven by the toothed-belt transmission (15a,15b) corresponds to the desired value.

14. The compaction device according to any one of claims 9 to 13, characterized in that a belt tensioning device is operative to tension the belt (32) for driving the unbalanced masses (3) and respectively of the pulleys (13) with the aid of eccentrically displaceable bearing pins (20a, 20b).

15. The compaction device according to any one of claims 9 to 14, characterized in that the belt transmission (15a,15b) comprises pulleys (13) which are coaxial and concentric with the rotational axis of the unbalanced masses (3) and whose weight distribution does not extend with rotational symmetry with respect to the rotational axis of the unbalanced masses (3).

16. A method for the compacting of ground by means of a drum (2) of a compacting device, wherein, with the aid of at least one vibration exciter (30a,30b) comprising rotating unbalanced masses (3), compacting vibrations of the drum (2) are generated, characterized by the use of a compaction device according to claim 1 in which the unbalanced masses (3) of the vibration exciters (30a,30b) in each part (2a,2b) of the drum (2) are rotated by the same angle with respect to the phase position as in the turning of the drum halves (2a,2b) relative to each other, so that a synchronization of the oscillatory movement of the two drum halves (2a,2b) is obtained even if the drum halves (2a, 2b) have been turned relative to each other.