

The invention relates to a set of shaped stones and to a paving element for paving ground areas with wide gaps between the shaped stones or paving elements.

Such shaped stones are frequently referred to as "lawn paving stones". They have spacing projections on the periphery thereof, so that comparatively wide gaps between the stones are created in the paved area. These gaps can be filled with soil, and grass may grow in the soil-filled gaps. The paved area thereby is given a pleasing appearance close to nature, while the area covered therewith is nevertheless paved and can be driven on by vehicles. As an alternative thereto, it is possible to fill the wide gaps for instance with relatively coarse sand or fine gravel or stone chips. The result is in both cases that surface water at least to a large extent enters into the spaces between the stones and need not be discharged along the surface of the paved area into a drain channel.

The lawn paving stones described must be distinguished from so-called lawn grid plates which have inner openings or perforations for creating grass growth at these locations.

The invention in concrete terms relates first to a set of shaped stones for paving ground areas with wide gaps between the shaped stones, having the following features:

- (a) the set of shaped stones comprises first shaped stones having a larger plan view area and second shaped stones separate therefrom and having a smaller plan view area,
- (b) with some of these shaped stones being provided on their periphery with a plurality of integral spacing projections.

Such a set of shaped stones is known from the document DE-A-38 04 760. With this set of shaped stones, the shaped stones of all kinds of shaped stones present are provided with integral spacing projections.

In comparison therewith, the set of shaped stones according to the invention is characterized in

- (c) that the shaped stones of one of the two kinds of shaped stones are free from spacing projections; and
- (d) that only the shaped stones of the other one of the two kinds of shaped stones are provided with the spacing projections for defining the wide gaps in the shaped stone pavement.

A ground area paved with the shaped stones of the shaped stone set presents a lively, pleasing appearance, since there is no monotonous repetition of one single format of shaped stones. The wide gaps do not extend rectilinearly or - for instance because of a non-rectilinear stone contour - in only slightly deviating manner from rectilinearity, but rather, gaps are obtained which are considerably laterally offset

in their outline pattern. This enhances the paved ground area as regards the capability thereof of being driven on, which is of particularly great significance in view of the wide gaps. Furthermore, the set of shaped stones can be manufactured more easily and in less expensive manner, since only the shaped stones of one of the two kinds of shaped stones are provided with the spacing projections that are more difficult to manufacture.

The invention in concrete terms refers second to a paving element for paving ground areas, which has - integrally connected by a material bridge - at least

- a first partial shaped stone having a larger plan view area; and
- a second partial shaped stone having a smaller plan view area.

Such a paving element is known from the document DE-A-27 32 452. This paving element is not provided with spacing projections on its outer periphery.

In comparison therewith the paving element according to the invention is characterized in

- (a) that the paving element, which is provided in the form of a shaped stone, has on its outer periphery integral spacing projections for defining wide gaps to adjacent shaped stones;
- (b) that the partial shaped stone of one of the two kinds of partial shaped stones is free from spacing projections on the outer periphery; and
- (c) that the spacing projections are provided only on the partial shaped stone of the other one of the two kinds of partial shaped stones.

In a ground area paved with this paving element, the same advantages result as regards appearance and gap

pattern as those elucidated hereinbefore for the set of shaped stones according to the invention. As regards improved manufacturing possibilities, the afore-mentioned advantage is also present for the most part in comparison with a paving element provided on its outer periphery with spacing projections both on the first partial shaped stone and on the second partial shaped stone, since an essential part of the periphery of the paving element does not have spacing projections.

Preferred developments of the shaped stone set according to the invention and the paving element according to the invention are indicated in claims 2 to 8 and 10 to 18. As regards the development features contained therein, further remarks will be made partly herein-after and partly further below in connection with preferred embodiments.

The term "different configuration of the two shaped stones or partial shaped stones, respectively" is to be understood as a difference in configuration exceeding the afore-mentioned difference in size of the plan view areas. While the invention in its broadest form covers also the first shaped stones and partial shaped stones, respectively, and second shaped stones and partial shaped stones, respectively, of equal geometrical configuration, for instance a larger square with a smaller square, a larger hexagon with a smaller hexagon, a larger octagon with a smaller octagon, a larger circle with a smaller circle, the development mentioned is directed to an alteration in the geometrical basic configuration.

When the first shaped stone or partial shaped stone is an octagon and the second shaped stone or partial shaped stone is a square, the lateral length of the

square preferably is substantially identical with the length of that side of the octagon which faces the square - possibly in the laid condition.

The dimensioning of the length of the spacing projections mentioned in claims 6 and 14 leads to the effect that, despite the difference in size of the plan view area between the first shaped stone or partial shaped stone and the second shaped stone or partial shaped stone, straight confining lines are formed in a paved ground area or in a group of juxtaposed shaped stones or paving elements. The latter effect is of significance since a group of shaped stones or paving elements thus can be conveniently and safely lifted off by means of mechanical clamping grippers and at the same time can be laid in mechanical manner.

The term "parallel to the useful side" in claims 8 and 18 is to comprise also that borderline case that the spacing projections or the material bridge, respectively, extend on their top side at the same height level in alignment with the useful side.

It is pointed out that the paving element according to the invention, which is provided in the form of a shaped stone, may also have several first partial shaped stones and several second partial shaped stones, so that, for instance, integral assemblies of 4, 6, 8 etc. partial shaped stones can be formed.

It is pointed out, furthermore, that the shaped stone set according to the invention and the paving element according to the invention may also have more than two shaped stone formats and partial shaped stone formats, respectively, for instance three or four different formats.

The shaped stone set according to the invention and the paving element according to the invention, respectively, preferably consist of concrete, but may also consist of other suitable materials that are adapted to be moulded in their raw state, such as for instance brick material, sand-lime material etc.

Subject matter of the invention is furthermore a metallic manufacturing mould for simultaneously making a plurality of shaped stones of concrete on the table of a manufacturing machine for making shaped concrete stones, characterized in

- (a) that the manufacturing mould comprises such shaping areas that it forms mutually alike sets of shaped stones according to any one of claims 1 to 8;
- (b) or that the manufacturing mould comprises such shaping areas that it forms mutually alike paving elements according to any one of claims 9 to 18.

Finally, subject matter of the invention is a ground area pavement of shaped stones with wide gaps between the shaped stones, comprising several rows of adjacently placed shaped stones, characterized in that first shaped stones according to the invention and second shaped stones according to the invention; of the set of shaped stones according to any one of claims 1 to 8, alternate with each other in progressing manner in the direction of the rows as well as transversely of the direction of the rows.

The invention and developments of the invention will be elucidated in more detail hereinafter by way of preferred embodiments shown in the drawings. The paving element elucidated by way of Figs. 3 and 4 and

provided in the form of a shaped stone will be briefly referred to as "shaped stone". In the drawings:

Fig. 1 shows a plan view of a set of shaped stones;

Fig. 2 shows a perspective view of the set of shaped stones of Fig. 1;

Fig. 3 shows a plan view of a shaped stone;

Fig. 4 shows a perspective view of the shaped stone of Fig. 3;

Fig. 5 shows a section of a ground area paved with sets of shaped stones according to Figs. 1/2 and with shaped stones according to Figs. 3/4, respectively;

Fig. 6 shows a horizontal sectional view of a manufacturing mould.

The shaped stone set 2, i.e. set of shaped stones, depicted in Figs. 1 and 2 consists of a first shaped stone 4 which is octagonal in plan view, and of a second shaped stone 6 which is square in plan view and has a rectangular spacing projection 8 on each side of the square. The plan view octagon of the first shaped stone 4 is centrally symmetrical, with longer sides 10 of the octagon alternating with shorter sides 12 of the octagon. The sides 14 of the plan view square of the second shaped stone 6 have substantially the same length as the longer sides 10 of the first shaped stone 4.

For ease of understanding, the first shaped stone 4 and the second shaped stone 6 are drawn in Figs. 1 and 2 with a free space therebetween. It is understood that the shaped stones for paving a ground area are laid so closely placed together that the end of a spacing projection 8 abuts on the centre of a longer side 10 of the first shaped stone 4.

It can be seen in Fig. 2 that the first shaped stone 4 and the second shaped stone 6 have a bevel 20 and 22, respectively, extending along the edge of their plan view area 16 and 18, respectively, which is their useful area. Furthermore, one can see that the top sides 24 of the spacing projections 8 extend below the level of the useful sides 16 and 18, respectively, as well as parallel thereto. Instead of the parallel extension, it may also be provided in particular that the top sides 24 are slanted downwardly and outwardly or extend in alignment with the useful side 18 or that the top sides 24 are shaped in the manner of a gable roof having a ridge line extending radially outwardly from the centre of the second shaped stone 6.

When, with reference to Fig. 1, the second shaped stone 6 is shifted leftwardly to the first shaped stone 4, one can easily imagine an outline rectangle circumscribing the entire shaped stone set 2, which in the present embodiment is a double-square outline rectangle. The latter extends along three of the four longer sides 10 and, at the second shaped stone 6, touches the ends of three of the four spacing projections 8. The shaped stone set 2 or a group of several of such shaped stone sets 2 can thus be easily and safely gripped in clamping manner by a mechanical clamping gripper having rectilinear clamping jaws.

A possible variant consists in designing also the second shaped stone 6 with beveled corners in plan view, so that it constitutes so-to-speak a version of the first shaped stone 4 which is reduced in plan view area. Furthermore, it is alternatively possible to provide the spacing projections 8 on the first shaped stone 4 instead of on the second shaped stone 6. These variants are also possible with the shaped stones according to Figs. 3 and 4 in analogous manner.

The integral shaped stone 32 according to Figs. 3 and 4 differs from the shaped stone set according to Figs. 1 and 2 in the following respect:

- (a) Instead of the first shaped stone 4 and the second shaped stone 6, there are provided a first partial shaped stone 34 and a second partial shaped stone 36 which are integrally joined together via a material bridge 38 (instead of the spacing projection 8 directed to the left in Fig. 1);
- (b) the material bridge 38 is - as measured in the longitudinal direction of the square side concerned of the second partial shaped stone 36, i.e. so-to-speak in the tangential direction related to the centre of the second partial shaped stone 36 - of greater width than the three remaining spacing projections 8.

Reference is made to the fact that the variants of the top side design of the spacing projections 8, described in connection with the first embodiment according to Figs. 1 and 2, are applicable here, too, in analogous manner for the top side design of the material bridge 38. In the embodiment depicted in Figs. 3 and 4 the material

bridge 38 is of lesser width than the length of a square side of the second partial shaped stone 36. As an alternative, it is possible to give the material bridge 38 a width corresponding to the length of this square side. Furthermore, it is possible to provide several material bridges 38 beside each other.

The paving pattern of Fig. 5 is formed when a ground area is paved either with shaped stone sets according to Figs. 1 and 2 or with shaped stones according to Figs. 3 and 4. Between the shaped stones and the partial shaped stones, respectively, there are formed wide gaps 50 having essentially the same width in the entire pavement. Due to the fact that the spacing projections 8 or material bridges 38, respectively, terminate at their top sides below the level of the useful surface of the shaped stones and partial shaped stones, respectively, the spaces above the spacing projections 8 and material bridges 38, respectively, are also filled with soil or permeable filling material, so that the spacing projections 8 and the material projections 38, respectively, are not visible any more. Grass growth in the gaps 50 is indicated in outline in the drawings. One can see that octagonal, larger stone shapes regularly alternate with square, smaller stone shapes, both in the progression along a row 52 in horizontal direction in Fig. 5 and in the direction at right angles thereto. Each square stone shape is surrounded on the four sides thereof by four octagonal stone shapes; each octagonal stone shape is surrounded on four sides thereof by square stone shapes (when disregarding that the shorter sides of the octagon are located opposite "diagonally" adjacent octagonal stone shapes). Finally, it is perceivable that the gaps 50, when progressing horizontally or vertically in Fig. 5, follow a considerably laterally staggered path, so that the wheels of vehicles, for instance passenger vehicles,

do not come into positions in which they rest on gap edges only. Rather, adjacent gap portions are offset to such an extent that the wheel concerned always rests on useful stone sides as well.

Fig. 6 shows a corner region section of a manufacturing mould 60, in a horizontal sectional view, for making a plurality of shaped stones 32 according to Figs. 3 and 4 on a horizontal table 62 of a manufacturing machine for making shaped stones of concrete. This manufacturing mould 60 corresponds to the prior art, with the exception of the configuration adapted to the shaped stones to be manufactured in the present case. For the purpose of illustration, the drawing shows a shaped stone 32 to be manufactured at the upper left of Fig. 6, and a further shaped stone 32 to be manufactured is shown therebelow, the upper shaped stone 32 having the first partial shaped stone 34 oriented towards the left, and the further shaped stone 32 having its first partial shaped stone 34 oriented towards the right. Additional adjacent shaped stones 32 to be manufactured are shown in fragmentary manner.

In the manufacturing mould 60 drawn in hatched manner, one can distinguish a mould frame 64 that is closed all around, and inner mould portions 66 contiguous with the mould frame 64. The manufacturing mould 60 either is a construction of parts welded together, or it is burned out from solid material by means of a laser beam. The inner wall of the mould frame 64 and the inner mould portions 66 are designed such that shaping areas 68 are formed in accordance with the shaped stones 32 to be manufactured. The top sides of the spacing projections 8 and of the material bridges 38 as well as the useful sides 42, 44 of the shaped stones 32 are formed by a shaping die, not shown, which is movable up and down and which is urged from above into the concrete material in the still soft state thereof.

It is easily conceivable what analogous manufacturing moulds 60 will look like, which are designed for simultaneously making a plurality of first shaped stones 4 or second shaped stones 6 of the set of shaped stones according to any one of claims 1 to 8 on the table of a manufacturing machine for making shaped stones of concrete.



P a t e n t   C l a i m s

1. A set of shaped stones for paving ground areas with wide gaps (50) between the shaped stones, having the following features:

- (a) the set of shaped stones comprises first shaped stones (4) having a larger plan view area and second shaped stones (6) separate therefrom and having a smaller plan view area,
- (b) with some of these paving stones (4; 6) being provided on their periphery with a plurality of integral spacing projections (8),

characterized in

- (c) that the shaped stones (4, 6) of one of the two kinds of shaped stones are free from spacing projections (8); and
- (d) that only the shaped stones (4, 6) of the other one of the two kinds of shaped stones are provided with the spacing projections (8) for defining the wide gaps (50) in the shaped stone pavement.

2. A set of shaped stones according to claim 1, characterized in that only the second shaped stones (6) are provided with the spacing projections (8).



3. A set of shaped stones according to claim 1 or 2, characterized in that the configuration of the first shaped stones (4) and the configuration of the second shaped stones (6) differ from each other.

4. A set of shaped stones according to any one of claims 1 to 3, characterized in that the first shaped stones (4), as seen in plan view, are octagons, preferably centrally symmetrical octagons with four longer and four shorter sides.

5. A set of shaped stones according to any one of claims 1 to 4, characterized in that the second shaped stones (6), as seen in plan view, are squares.

6. A set of shaped stones according to any one of claims 2 to 5, characterized in that the spacing projections (8) on the second shaped stones (6) project to such an extent that, when a second shaped stone (6) is located centrally beside a first shaped stone (4), the pair of shaped stones can be circumscribed by a common outline rectangle touching the first shaped stone (4) at the periphery thereof and touching the ends of the spacing projections (8).

7. A set of shaped stones according to any one of claims 1 to 6, characterized in that the top sides (24) of the spacing projections (8) are located at a lower level than the useful side (18) of the associated shaped stone (6).

8. A set of shaped stones according to any one of claims 1 to 7, characterized in that the spacing projections (8), on the top side thereof, are parallel to the useful side (18) of the associated shaped stone



(6) or are slanted downwardly and outwardly or have the configuration of a gable roof.

9. A paving element for paving ground areas, which - integrally connected by a material bridge - comprises at least

- a first partial shaped stone (34) having a larger plan view area; and
- a second partial shaped stone (36) having a smaller plan view area,

characterized in

- (a) that the paving element (32) provided in the form of a shaped stone (32) has on its outer periphery integral spacing projections (8) for defining wide gaps (50) to adjacent shaped stones (32);
- (b) that the partial shaped stone (34, 36) of one of the two kinds of partial shaped stones is free from spacing projections (8) on the outer periphery; and
- (c) that the spacing projections (8) are provided only on the partial shaped stone (34, 36) of the other one of the two kinds of partial shaped stones.

10. A paving element according to claim 9, characterized in that the spacing projections (8) are provided on the periphery of only the second partial shaped stone (36).

11. A paving element according to claim 9 or 10; characterized in that the configuration of the first partial shaped stone (34) and the configuration of the second partial shpaed stone (36) differ from each other.

12. A paving element according to any one of claims 9 to 11, characterized in that the first partial shaped



stone (34); as seen in plan view, is an octagon, preferably a centrally symmetrical octagon with four longer and four shorter sides.

13. A paving element according to any one of claims 9 to 12, characterized in that the second partial shaped stone (36), as seen in plan view, is square.

14. A paving element according to any one of claims 10 to 13, characterized in that the paving element (32) consists of a first partial shaped stone (34) and a second partial shaped stone (36); and that the spacing projections (8) on the second partial shaped stone (36) project to such an extent that the paving element (32) can be circumscribed by an outline rectangle touching the first partial shaped stone (34) at the periphery thereof and touching the ends of the spacing projections (8).

15. A paving element according to any one of claims 9 to 14, characterized in that the material bridge (38), as measured in tangential direction related to the centre of the second partial shaped stone (36), is of less width than the peripheral portions of the first and second partial shaped stones (34, 36) facing each other, but preferably is of greater width than the width of the spacing projections (8).

16. A paving element according to any one of claims 9 to 15, characterized in that the material bridge (38), as measured in radial direction related to the centre of the second partial shaped stone (36), has substantially the same length as the spacing projections (8).

17. A paving element according to any one of claims 9 to 16, characterized in that the top sides of the



spacing projections (8) and/or of the material bridge (38) are located at the lower level than the useful side of the paving element (32).

18. A paving element according to any one of claims 9 to 17, characterized in that the spacing projections (8) and/or the material bridge (38), on the top side thereof, are parallel to the useful side of the paving element (32) or are slanted downwardly and outwardly or have the configuration of a gable roof.

19. A metallic manufacturing mould (60) for simultaneously making a plurality of shaped stones of concrete on the table of a manufacturing machine for making shaped stones of concrete, characterized in

- (a) that the manufacturing mould (60) comprises such shaping areas that it forms mutually alike sets of shaped stones according to any one of claims 1 to 8;
- (b) or that the manufacturing mould (60) comprises such shaping areas that it forms mutually alike paving elements according to any one of claims 9 to 18.

20. A ground covering pavement of shaped stones (4, 6) with wide gaps (50) between the shaped stones (4, 6), comprising several rows of adjacently placed shaped stones (4, 6), characterized in that first shaped stones (4) and second shaped stones of the set of shaped stones according to any one of claims 1 to 8 alternate with each other in progressing manner both in direction of the rows as well as transversely of the direction of the rows.