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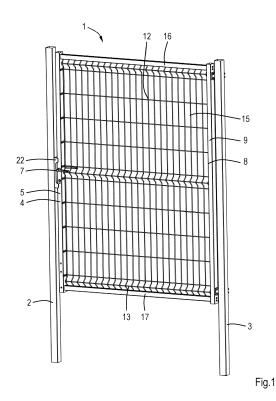
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(54) A SWING GATE AND A KIT OF PARTS

A swing gate (1) comprises a first column (4) including a front side (5), a back side (6) and a handle (7) or a handle receiving portion for accommodating a handle (7), a second column (8) including a front side (9), a back side (10) and a hinge (11) or a hinge receiving portion for accommodating a hinge (11), and a rigid plate-shaped element (12) extending in a main plane (P1) and including a front side (13) and a back side (14). The plate-shaped element (12) extends between the first column (4) and the second column (8). The swing gate is a modular swing gate (1). The front side (13) of the plate-shaped element is different from its back side (14). The plate-shaped element (12) is releasably attached to the first column (4) and the second column (8) such that either the front sides (5, 9, 13) of the first column (4), the second column (8) and the plate-shaped element (12) face in the same direction or the front sides (5, 9) of the first and second columns (4, 8) and the back side (14) of the plate-shaped element (12) face in the same direction.



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[0001] The present invention relates to a swing gate, comprising a first column including a front side, a back side and a handle or a handle receiving portion for accommodating a handle, a second column including a front side, a back side and a hinge or a hinge receiving portion for accommodating a hinge, and a rigid plateshaped element extending in a main plane and including a front side and a back side, which plate-shaped element extends between the first column and the second column. [0002] Such a swing gate is known from DE 295 15 496. The first column and the second column of the known swing gate cooperate with respective gate posts which are located at opposites sides of the swing gate. The swing gate, the gate posts and the mounting elements such as pivots are adapted such that the swing gate can be mounted in different opening directions with respect to the gate posts by using a minimum number of different parts, for example for a clockwise and an anticlockwise opening as seen from above. The plateshaped element of the known swing gate comprises an upper beam, a lower beam and a wire mesh which extends between the upper beam and the lower beam. The upper beam and the lower beam are fixed to end portions of the first and second columns such that they form a rectangular unit. The wire mesh is fixed to the upper beam, the lower beam, the first column and the second column. These parts are usually attached to each other through welding, since there are legal requirements to the rigidity of swing gates.

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[0003] An object of the invention is to provide an improved swing gate.

[0004] This object is accomplished with the swing gate according to the invention, wherein the swing gate is a modular swing gate, wherein the front side of the plate-shaped element is different from its back side and wherein the plate-shaped element is releasably attached to the first column and the second column such that either the front sides of the first column, the second column and the plate-shaped element face in the same direction or the front sides of the first and second columns and the back side of the plate-shaped element face in the same direction.

[0005] An advantage of the modular swing gate according to the invention is that the plate-shaped element can have two different positions with respect to the first and second columns, which is relevant in case of a plate-shaped element which has a front side that differs from its back side. An end user may choose which side of the plate-shaped element should face in the same direction as the front sides of the first column and the second column. Since the first column is provided with a handle or a handle receiving portion for accommodating a handle and the second column is provided with a hinge or a hinge receiving portion the first and second columns are different.

[0006] Preferably, the main plane extends in the middle

of the first column between its front side and back side and in the middle of the second column between its front side and back side, since this provides a symmetrical arrangement. When the plate-shaped element is turned 180° with respect to the first and second columns about an axis parallel to the first and second columns the main plane stays in the middle of the first and second columns. [0007] In a preferred embodiment the plate-shaped element has at least a pair of lateral projections projecting at opposite sides of the plate-shaped element and fit in cooperating holes in the first and second columns, wherein the swing gate has at least a crossbar which is releasably attached to the first column and the second column such that the pair of lateral projections are accommodated in the cooperating holes when the crossbar is attached to the first column and the second column, since this makes assembly of the first and second columns and the plate-shaped element easy and provides a strong connection so as to obtain a rigid swing gate. When the crossbar is detached from the first and second columns the plate-shaped element can be detached from the first and second columns by simply pulling out the lateral projections from the first and second columns.

[0008] In a practical embodiment the crossbar is an upper beam which is releasably attached to upper end portions of the first column and the second column, respectively, wherein the swing gate also comprises a lower beam which is releasably attached to lower end portions of the first column and the second column, respectively, which lower end portions are remote from the respective upper end portions. The upper beam, the lower beam, the first column and the second column may form a rectangular frame providing appropriate rigidity to the modular swing gate. The plate-shaped element may extend from the upper beam to the lower beam. The plate-shaped element may contact the upper beam and/or the lower beam or it may even be releasably attached to the upper beam and/or the lower beam.

[0009] In a particular embodiment the lateral projections are offset projections and the cooperating holes are offset holes in the first and second columns, wherein the offset projections have a centre plane between opposite outer sides thereof which extends parallel to the main plane, wherein each of the first and second columns is provided with two offset holes at a distance from each other in transverse direction of the first and second columns, respectively, wherein one of the two offset holes is configured to receive one of the offset projections in case the front sides of the first column, the second column and the plate-shaped element face in the same direction and the other one of the two offset holes is configured to receive the other one of the offset projections in case the front sides of the first and second columns and the back side of the plate-shaped element face in the same direction. Hence, the offset projections always fit in respective offset holes, independent from the orientation of the plate-shaped element with respect to the first and second columns. The distance between centrelines of the two

offset holes in transverse direction of the first and second columns equals twice the distance between the main plane and the centre plane of the offset projections.

[0010] In a preferred embodiment the plate-shaped element comprises a 3D wire mesh. A 3D wire mesh has vertical wires and horizontal wires which extend perpendicularly with respect to each other and are attached to each other at crossing points, for example through resistance welding, and is known in the art. It has flat portions between which the wire mesh is bend such that it locally has a triangular cross-section. Consequently, it has a front side which is different from its back side. It is noted that a 3D wire mesh is a cost-efficient alternative to a double rod 2D wire mesh. The special 3D technique ensures the stability of this single 3D wire mesh. Hence, a 3D wire mesh forms a rigid structure.

[0011] In a particular embodiment the offset projections are formed by opposite end portions of a wire of the 3D wire mesh. More specifically, the 3D wire mesh has vertical wires which extend parallel to the first and second columns and horizontal wires which extend perpendicular to the first and second columns. In this case the pair of offset projections is formed by opposite end portions of the horizontal wire.

[0012] The above-mentioned two offset holes may be present in an insert, wherein the inserts are mounted in complementary slot-shaped holes in the first and second columns, respectively. The inserts may be made of plastic and attachable to the first and second columns through snap-fit connections, for example.

[0013] In practice, the hinge or hinge receiving portion may be located at a different distance from an end of the second column than the handle or handle receiving portion from an end of the first column. For example, the handle or handle receiving portion may be located halfway the first column; the second column may have two hinges or hinge receiving portions, for example located at 1/3 from an upper end and a lower end, respectively, of the second column.

[0014] The first and second columns may be made of 40 metal.

[0015] The upper and lower beams may also be made of metal.

[0016] The invention is also related to a kit of parts for assembling a swing gate as described hereinbefore, comprising a first column including a front side, a back side and a handle or a handle receiving portion for accommodating a handle, a second column including a front side, a back side and a hinge or a hinge receiving portion for accommodating a hinge, and a rigid plate-shaped element including a front side and a back side, wherein the plate-shaped element is attachable to the first column and the second column such that the plate-shaped element extends between the first column and the second column, wherein either the front sides of the first column, the second column and the plate-shaped element face in the same direction or the front sides of the first and second columns and the back side of the

plate-shaped element face in the same direction. An advantage of the kit of parts is that a single first column, a single second column and a single plate-shaped element having a different front side and back side provides the opportunity to assemble a rigid swing gate in different configurations, but using a limited number of different parts.

[0017] For example, in case of the embodiment of the swing gate which is provided with the 3D wire mesh wherein the offset projections are formed by opposite end portions of a wire of the 3D wire mesh, the kit of parts may also comprise the upper beam, the lower beam and the 3D wire mesh, and possibly the inserts as well.

[0018] The kit of parts may also comprise a hinge post for cooperating with the second column and a closure beam for cooperating with the first column. The closure beam may be a closure post. The hinge post and/or the closure post are intended to insert into the ground.

[0019] The closure beam may be provided with a gate stop or a gate stop receiving portion for accommodating a gate stop and the hinge post may be provided with a hinge or a hinge receiving portion for accommodating a hinge. The closure beam or the gate stop may also comprise a hole for receiving a latch that is connected to the handle.

[0020] The closure beam may be part of a second swing gate.

[0021] The invention will hereafter be elucidated with reference to very schematic drawings showing embodiments of the invention by way of example.

Fig. 1 is a perspective view of an embodiment of the swing gate according to the invention.

Fig. 2 is a similar view as Fig. 1 as seen from an opposite side.

Fig. 3 is an exploded perspective view of the swing gate as shown in Figs. 1 and 2.

Fig. 4 is a plan view of the swing gate as shown in Figs. 1 and 2.

Fig. 5 is an enlarged exploded view of a part of the embodiment of Fig. 2 which is indicated by Vin Fig. 2. Figs. 6 and 7 are similar views as Figs. 3 and 4, respectively, but showing a different configuration of the swing gate.

Figs. 8 and 9 are similar views as Figs. 3 and 4, respectively, but showing a further different configuration of the swing gate.

Figs. 10 and 11 are similar views as Figs. 3 and 4, respectively, but showing a still further different configuration of the swing gate.

Fig. 12 is an enlarged perspective view of a part of the swing gate as shown in Fig. 1.

Fig. 13 is an enlarged side view of a part of the swing gate as shown in Fig. 5.

Fig. 14 is a front view of a double swing gate.

[0022] Figs. 1 and 2 show opposite sides of an embodiment of a modular swing gate 1 according to the inven-

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tion, Figs. 3 and 5 show some details of the swing gate 1 and Fig. 4 shows the swing gate 1 as seen from above. The swing gate 1 cooperates with a closure post 2 and a hinge post 3. The closure post 2 and the hinge post 3 may be hollow columns having a rectangular cross-section and may be made of steel. When installing the swing gate 1 at a desired location lower end portions of the closure post 2 and the hinge post 3 are inserted into the ground.

[0023] The swing gate 1 comprises a first column 4 including a front side 5, a back side 6 and a handle receiving portion which accommodates a handle 7. The handle receiving portion may comprise a through-hole through which a shaft of the handle 7 may pass and threaded holes in which bolts can be screwed to mount a bearing of the handle 7 to the first column 4. The swing gate 1 also comprises a second column 8 including a front side 9, a back side 10 and hinge receiving portions which accommodate respective hinges 11. The hinge receiving portions may comprise threaded holes in which bolts can be screwed to mount the hinges 11 to the second column 8. The hinges 11 are located at different distances from an upper end of the second column 8 than the handle 7 from an upper end of the first column 4. This means that the first column 4 and the second column 8 are different. The first and second columns 4, 8 may be hollow columns including rectangular cross-sections and may be made of steel.

[0024] The swing gate 1 is further provided with a rigid plate-shaped element 12 including a front side 13 and a back side 14. The plate-shaped element 12 extends between the first column 4 and the second column 8. The plate-shaped element 12 extends in a main plane PI, see Fig. 13. In this case the first and second columns 4, 8 span the main plane PI, whereas the main plane P1 extends in the middle of the first column 4 between its front side 5 and back side 6 and in the middle of the second column 8 between its front side 9 and back side 10. The front side 13 of the plate-shaped element 12 is different from its back side 14. In this case the plate-shaped element 12 comprises a so-called 3D wire mesh 15. Due to the three dimensional shape the 3D wire mesh 15 is rigid. [0025] The swing gate 1 is also provided with an upper beam 16 and a lower beam 17 in order to provide a rigid rectangular frame structure. The upper beam 16 and the lower beam 17 are attached to end portions of the first and second columns 4, 8. This is illustrated in Fig. 5, which shows a connection between an upper end portion of the second column 8 and the upper beam 16. Upon assembly the upper beam 16 is inserted into a complementary through-hole 18 in the second column 8 until a locking plate 19 which is welded to an end of the upper beam 16 abuts an opposite side wall of the second column 8. Subsequently, bolts 20 can be put through through-holes in the side wall and screwed into threaded holes in the locking plate 19. The opposite end of the upper beam 16 is attached to the first column 4 in a similar way, whereas opposite ends of the lower beam 17 are

also attached in a similar way to the first and second columns 4, 8.

[0026] In the configuration as shown in Figs. 1-5 planar upper and lower portions of the 3D wire mesh 15 are located at back sides of the upper and lower beams 16, 17, respectively, which are directed in the same direction as the back sides 6, 10 of the first and second columns 4, 8, respectively, such that they are invisible when viewing the front side 13 of the rigid plate-shaped element 12. [0027] Fig. 5 shows in detail how the hinge 11 is mounted to the hinge post 3 and to one of the hinge receiving portions at the second column 8 through a hinge plate 21. In assembled condition the swing gate 1 according to the configuration as shown in Figs. 1-5 can be opened clockwise as seen from above. When it is desired to open the swing gate 1 in anti-clockwise direction the hinge post 3 can be turned 180° about a longitudinal axis thereof and the hinge plate 21 can be turned 180° about an axis perpendicular to its plane and fixed at the hinge receiving portion at the second column 8 such that the hinge 11 can be located at the opposite side of the swing gate 1 than shown in Figs. 1-5. It is noted that the hinge receiving portion is located at a centre plane of the second column 8 between its front side 9 and its back side 10 in order to obtain a similar relative position of the hinge post 3 and the second column 8 for both the clockwise and the anti-clockwise opening of the swing gate 1.

[0028] When switching between clockwise opening and anti-clockwise opening the closure post 2 and the first column 4 including the handle 7 may stay in place, but a latch connected to the handle 7 for keeping the swing gate 1 shut may be turned 180° about a horizontal axis to reverse its operation direction, which is a well-known technique. Furthermore, a gate stop 22 can be turned 180° about a horizontal axis when switching the swing gate 1 from clockwise to anti-clockwise opening. The resulting arrangement is illustrated in Figs. 6 and 7. Comparing Figs. 3 and 4 with Figs. 6 and 7 it can be seen that the configuration of the swing gate 1 is the same, but the orientation of the gate stop 22, the orientation of the hinge post 3 and the locations of the hinges 11 with respect to the second column 8 are different.

[0029] If it is desired to modify the right hand swing gate 1 as shown in Figs. 1-5 as well as in Figs. 6 and 7 to a left hand swing gate, the whole unit including the swing gate 1 and the first and hinge posts 2, 3 could be turned 180° about a vertical axis, whereas the hinges 11, the gate stop 22 and the latch can be reversed, as described hereinbefore, to switch between clockwise and anti-clockwise opening. However, in doing so the front side 13 and the back side 14 of the plate-shaped element 12 will be reversed, as well, which may be undesired. The swing gate 1 according to the present invention solves this by providing the opportunity to reverse the plate-shaped element 12 with respect to the first and second columns 4, 8. In other words, the plate-shaped element 12 is releasably attached to the first column 4 and the second column 8 such that either the front side 5 of

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the first column 4, the front side 9 of the second column 8 and the front side 13 of the plate-shaped element 12 face in the same direction or the front side 5 of the first column 4, the front side 9 of the second column 8 and the back side 14 of the plate-shaped element 12 face in the same direction. The former situation is shown in Figs. 1-5 and Figs. 6 and 7, whereas the latter situation is shown in Figs. 8 and 9 for a configuration of anti-clockwise opening and in Figs. 10 and 11 for a configuration of clockwise opening as seen from above.

[0030] A portion of the plate-shaped element 12 that extends between the upper beam 16 and the lower beam 17 is mounted to the first column 4 and the second column 8. Referring to the figures, in particular Figs. 5 and 12, it can be seen that the 3D wire mesh 15 has pairs of lateral projections in the form of offset projections 23. Each pair of offset projections 23 are opposite end portions of a horizontal wire of the 3D wire mesh 15. The offset projections 23 fit in cooperating offset holes 24 in the first and second columns 4, 8, see Fig. 12. The offset holes 24 are provided in inserts 25 which in turn fit in respective slot holes in the first and second columns 4, 8. When the upper and lower beams 16, 17 are attached to the first column 4 and the second column 8 the offset projections 23 are accommodated in the cooperating holes 24, such that the 3D wire mesh 15 is locked in the first and second columns 4, 8.

[0031] Fig. 13 shows that the offset projections 23 of the 3D wire mesh 15 have a centre plane P2 between opposite outer sides thereof. The centre plane P2 is parallel to the main plane P1. Since the centre plane P2 lies at a distance from the main plane P1, the offset projections 23 will be located at different locations with respect to the first and second columns 4, 8 when switching between the right hand and the left hand opening configurations, whereas keeping the main plain P1 at the same location with respect to the first and second columns 4. 8. For this reason the distance between the centrelines of two offset holes 24 of an insert 25 equals twice the distance between the main plane P1 and the centre plane P2. One of the two offset holes 24 of an insert 25 is configured to receive one of a pair of opposite offset projections 23 in case the front sides 5, 9, 13 of the first column 4, the second column 8 and the plate-shaped element 12 face in the same direction and the other one of the two offset holes 24 is configured to receive the other one of the pair of opposite offset projections 23 in case the front sides 5, 9 of the first and second columns 4, 8 and the back side 14 of the plate-shaped element 12 face in the same direction. It is noted that the main plane P1 lies in the middle of opposite outer sides of the upper and lower beams 16, 17 in this case.

[0032] In the configurations as shown in the figures and described hereinbefore the upper and lower portions of the 3D wire mesh 15 are located at the back sides of the upper and lower beams 16, 17, respectively. In an alternative embodiment (not shown) the upper and lower portions of the 3D wire mesh 15 may fixed to the upper

and lower beams 16, 17, for example by means of welding. This means that the plate-shaped element 12 comprises a 3D wire mesh 15, an upper beam 16 and a lower beam 17. In this case, end portions of the upper beam 16 and end portions of the lower beam 17 form respective pairs of central projections which have a centre plane between opposite outer sides thereof that coincides with the main plane P1. Furthermore, the complementary holes 18 may be considered as being central holes having a centre plane between opposite edges thereof, which centre plane also coincides with the main plane. The opposite outer sides of the central projections are located at the same distance from the main plane P1, such that their positions with respect to the first and second columns 4, 8 are the same when reversing the plateshaped element 12 with respect to the first and second columns 4, 8. Since the upper beam 16 and the lower beam 17 are releasably attached to the first and second columns 4, 8 and the offset projections 23 fit in the cooperating offset holes 24 the plate-shaped element 12 is releasably attached to the first column 4 and the second column 8 such that either the front sides 5, 9, 13 of the first column 4, the second column 8 and the plate-shaped element 12 face in the same direction or the front sides 5, 9 of the first and second columns 4, 8 and the back side 14 of the plate-shaped element 12 face in the same direction.

[0033] The invention is also related to a kit of parts. The embodiment of the swing gate 1 as described above and shown in the figures can be supplied as a kit of parts which can be assembled by an end user. The kit of parts may at least comprise the first column 4 including the handle 7 or the handle receiving portion for accommodating the handle 7, the second column 8 including the hinges 11 or the hinge receiving portions for accommodating the hinges 11, the 3D wire mesh 15, the upper beam 16, the lower beam 17 and the inserts 25 as non-assembled parts. The kit may also comprise the closure post 2, the hinge post 3, the gate stop 22 and mounting materials for assembling the separate parts.

[0034] It is noted that instead of the closure post 2 the kit may comprise a closure beam 26 which is part of a second swing gate 27 as shown in Fig. 14. It can be seen that the gate stop 22 is mounted to the closure beam 26 in this case.

[0035] The invention is not limited to the embodiments shown in the drawings and described hereinbefore, which may be varied in different manners within the scope of the claims and its technical equivalents. For example, the plate-shaped element may be different from a 3D wire mesh.

Claims

1. A swing gate (1), comprising a first column (4) including a front side (5), a back side (6) and a handle (7) or a handle receiving portion for accommodating

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a handle (7), a second column (8) including a front side (9), a back side (10) and a hinge (11) or a hinge receiving portion for accommodating a hinge (11), and a rigid plate-shaped element (12) extending in a main plane (PI) and including a front side (13) and a back side (14), which plate-shaped element (12) extends between the first column (4) and the second column (8), characterized in that the swing gate is a modular swing gate (1), wherein the front side (13) of the plate-shaped element is different from its back side (14) and wherein the plate-shaped element (12) is releasably attached to the first column (4) and the second column (8) such that either the front sides (5, 9, 13) of the first column (4), the second column (8) and the plate-shaped element (12) face in the same direction or the front sides (5, 9) of the first and second columns (4, 8) and the back side (14) of the plate-shaped element (12) face in the same direc-

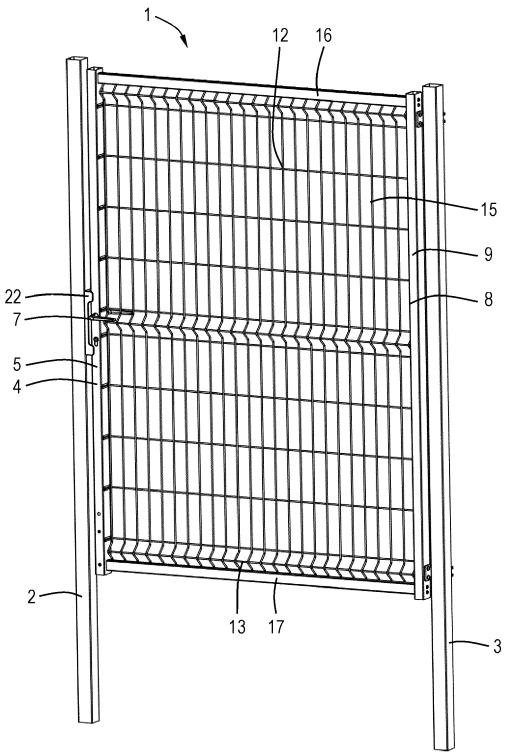
- 2. A swing gate (1) according to claim 1, wherein the main plane (PI) extends in the middle of the first column (4) between its front side (5) and back side (6) and in the middle of the second column (8) between its front side (9) and back side (10).
- 3. A swing gate (1) according to claim 1 or 2, wherein the plate-shaped element (12) has at least a pair of lateral projections (23) projecting at opposite sides of the plate-shaped element (12) and fit in cooperating holes (24) in the first and second columns (4, 8), wherein the swing gate has at least a crossbar (16, 17) which is releasably attached to the first column (4) and the second column (8) such that the pair of lateral projections (23) are accommodated in the cooperating holes (24) when the crossbar (16, 17) is attached to the first column (4) and the second column (8).
- 4. A swing gate (1) according to claim 3, wherein the crossbar is an upper beam (16) which is releasably attached to upper end portions of the first column (4) and the second column (8), respectively, wherein the swing gate (1) also comprises a lower beam (17) which is releasably attached to lower end portions of the first column (4) and the second column (8), respectively, which lower end portions are remote from the respective upper end portions.
- 5. A swing gate (1) according to claim 3 or 4, wherein the lateral projections are offset projections (23) and the cooperating holes are offset holes (24) in the first and second columns (4, 8), wherein the offset projections (23) have a centre plane (P2) between opposite outer sides thereof which extends parallel to the main plane (PI), wherein each of the first and second columns (4, 8) is provided with two offset holes (24) at a distance from each other in transverse

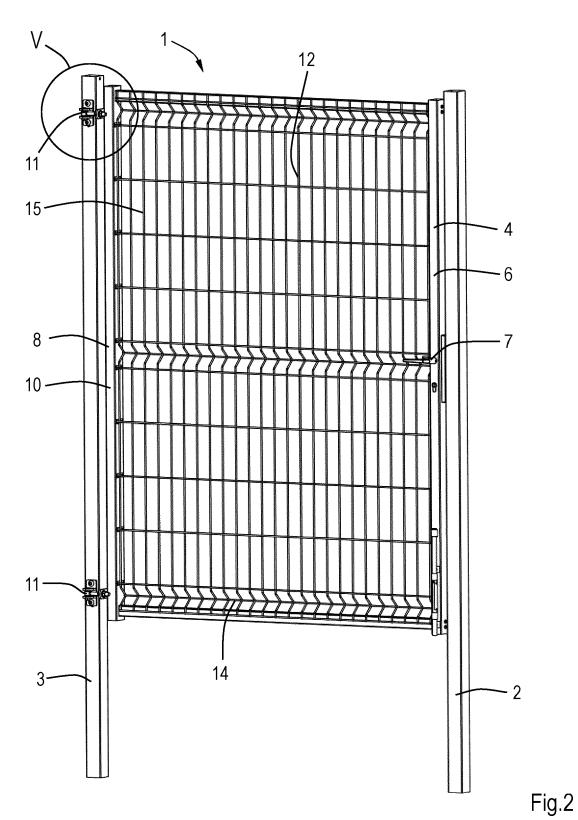
direction of the first and second columns (4, 8), respectively, wherein one of the two offset holes (24) is configured to receive one of the offset projections (23) in case the front sides (5, 9, 13) of the first column (4), the second column (8) and the plate-shaped element (12) face in the same direction and the other one of the two offset holes (24) is configured to receive the other one of the offset projections (23) in case the front sides (5, 9) of the first and second columns (4, 8) and the back side (14) of the plate-shaped element (12) face in the same direction.

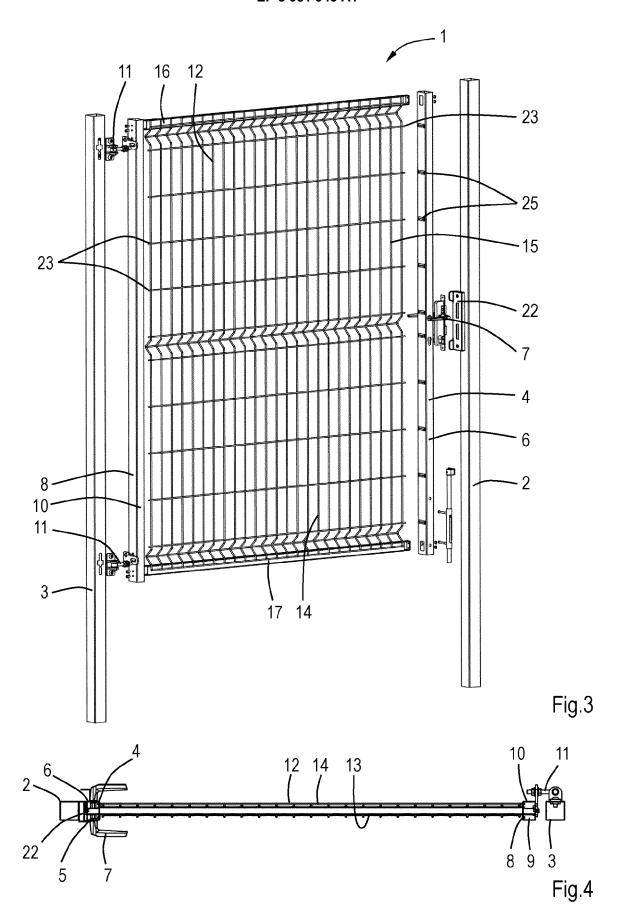
- **6.** A swing gate (1) according to any one of the preceding claims, wherein the plate-shaped element (12) comprises a 3D wire mesh (15).
- 7. A swing gate (1) according to claim 5 and 6, wherein the offset projections (23) are formed by opposite end portions of a wire of the 3D wire mesh (15).
- 8. A swing gate (1) according to any one of the preceding claims and claim 5, wherein said two offset holes (24) are present in an insert (25), wherein the inserts (25) are mounted in complementary slot-shaped holes in the first and second columns (4, 8), respectively.
- 9. A swing gate (1) according to any one of the preceding claims, wherein the hinge (11) or hinge receiving portion is located at a different distance from an end of the second column (8) than the handle (7) or handle receiving portion from an end of the first column (4).
- A swing gate (1) according to any one of the preceding claims, wherein the first and second columns (4, 8) are made of metal.
- **11.** A swing gate (1) according to any one of the preceding claims and claim 4, wherein the upper and lower beams (16, 17) are made of metal.
- 12. A kit of parts for assembling a swing gate (1) according to any one of the preceding claims, comprising a first column (4) including a front side (5), a back side (6) and a handle (7) or a handle receiving portion for accommodating a handle (7), a second column (8) including a front side (9), a back side (10) and a hinge (11) or a hinge receiving portion for accommodating a hinge (11), and a rigid plate-shaped element (12) including a front side (13) and a back side (14), wherein the plate-shaped element (12) is attachable to the first column (4) and the second column (8) such that the plate-shaped element (12) extends between the first column (4) and the second column (8), wherein either the front sides (5, 9, 13) of the first column (4), the second column (8) and the plateshaped element (12) face in the same direction or

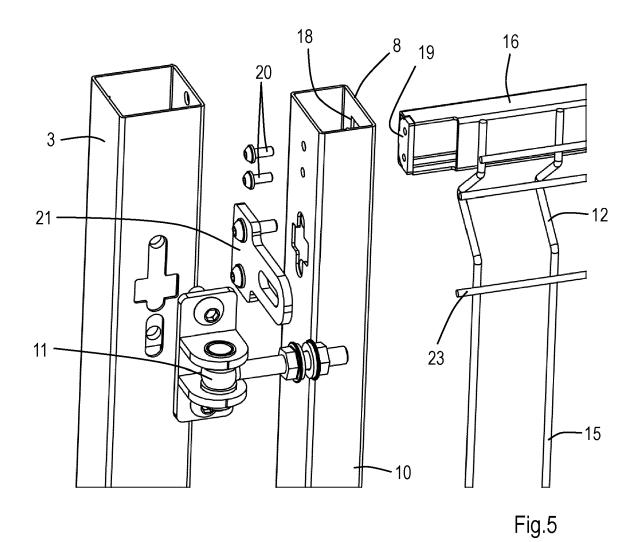
the front sides (5, 9) of the first and second columns (4, 8) and the back side (14) of the plate-shaped element (12) face in the same direction.

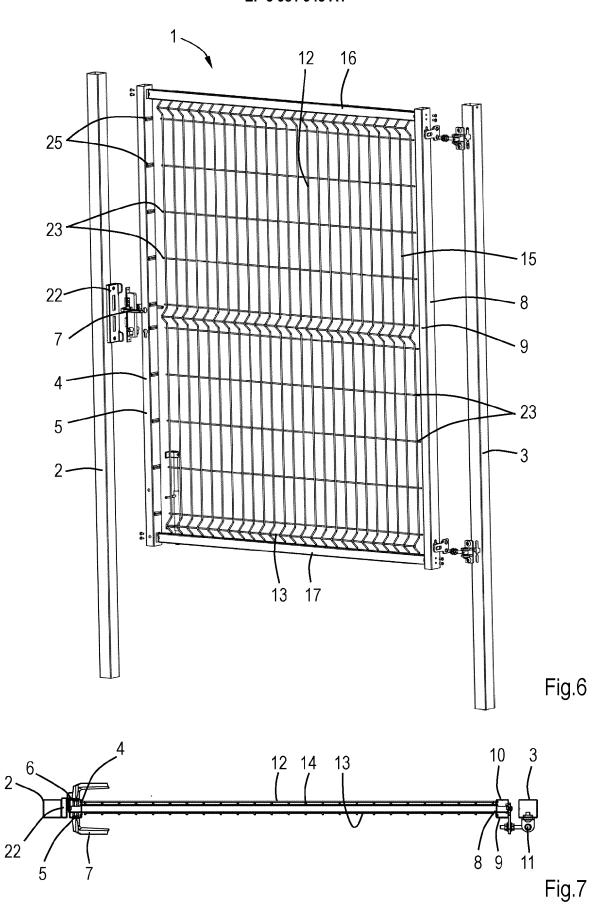
- **13.** A kit of parts according to claim 12, comprising a hinge post (3) for cooperating with the second column (8) and a closure beam (2, 26) for cooperating with the first column (4).
- **14.** A kit of parts according to claim 13, wherein the closure beam (2, 26) is provided with a gate stop (22) or a gate stop receiving portion for accommodating a gate stop (22) and wherein the hinge post (3) is provided with a hinge (11) or a hinge receiving portion for accommodating a hinge (11).
- **15.** A kit of parts according to claim 13 or 14, wherein the closure beam (26) is part of a second swing gate (22) or wherein the closure beam is a closure post (2).

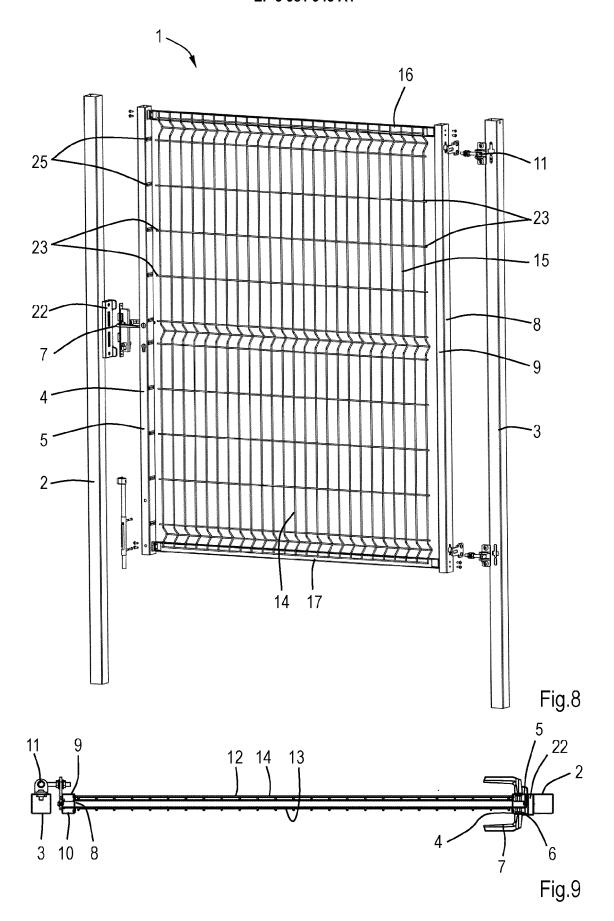


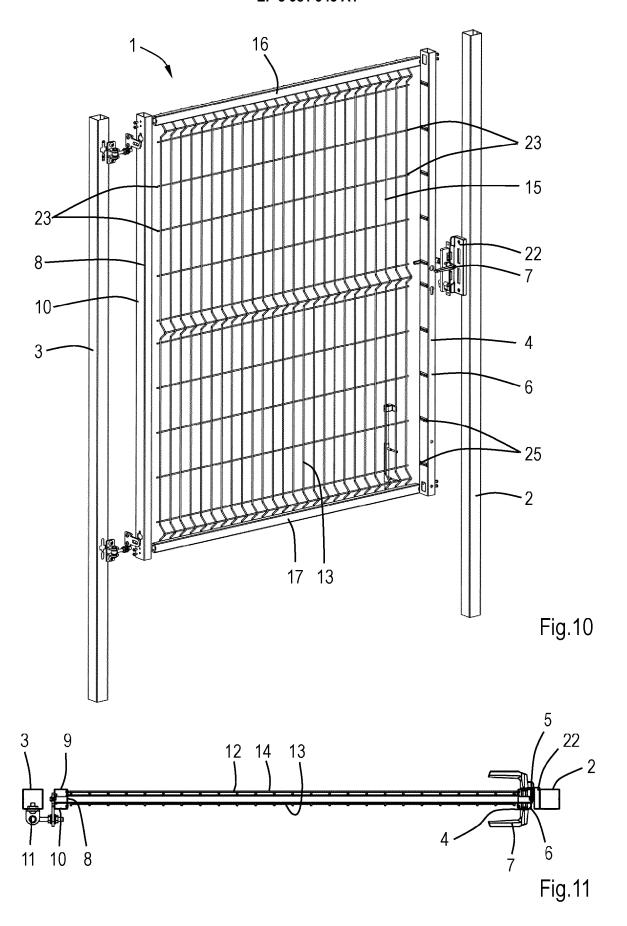












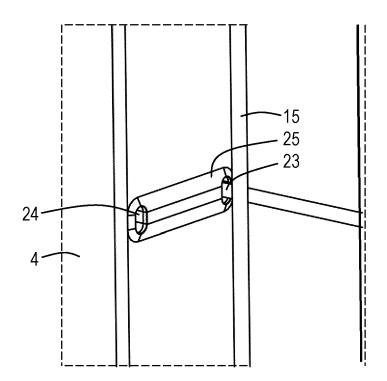
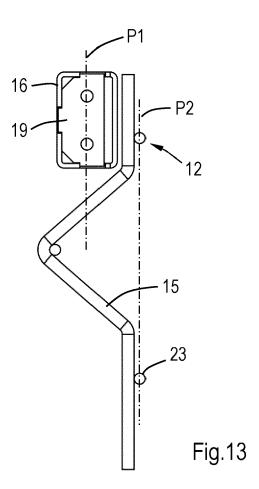


Fig.12



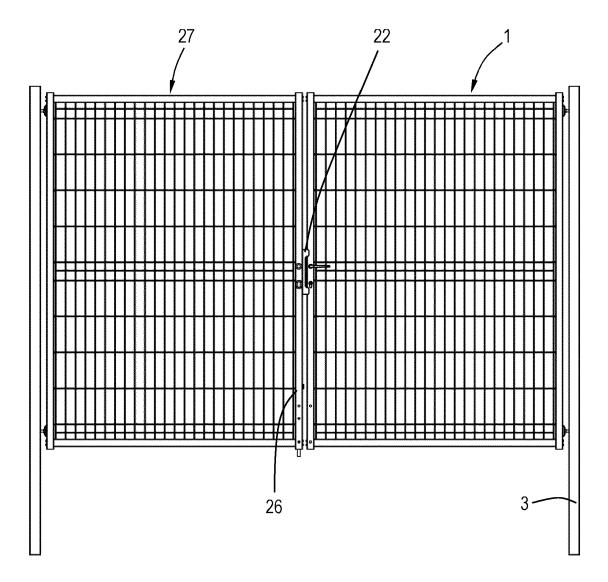


Fig.14



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